T Power

MOTOROLA

Mobile FM T

25-54 MC 50 W RF POWER 12 VDC

PRINTED IN U. S. A.

68P862725-E

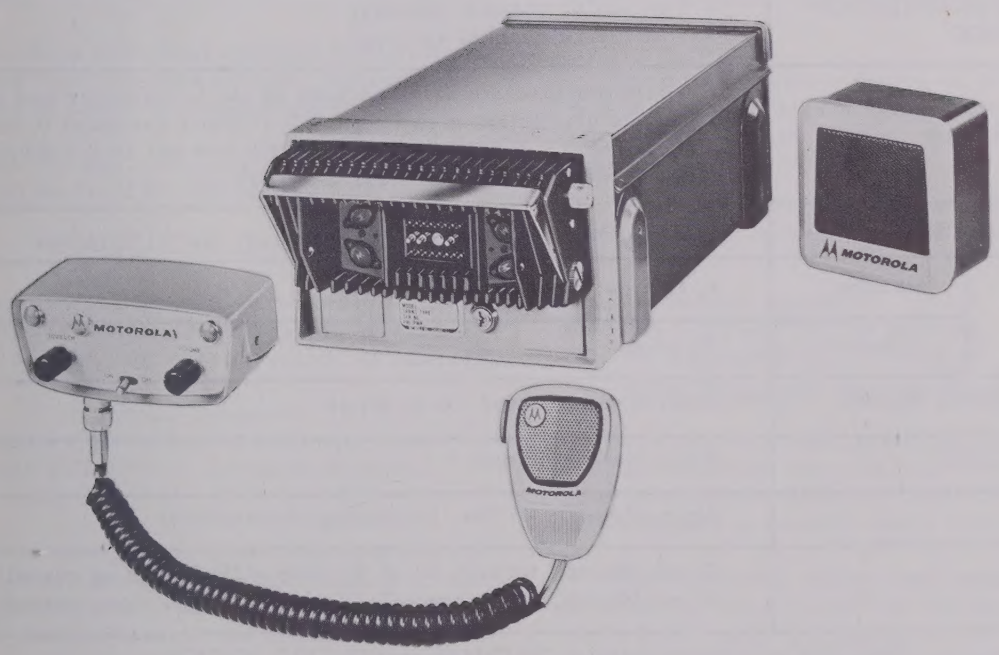
SECTION INDEX
DESCRIPTION
INSTALLATION & OPERATION
TRANSMITTER
RECEIVER
POWER SUPPLY
MAINTENANCE

MOTOROLA

"T-POWER" MOBILE

FM TWO-WAY RADIO

50 W RF POWER
25-54 MC
12 VDC



MOTOROLA INC. COMMUNICATIONS DIVISION

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68P862725
Issue - E

GUARANTEED PERFORMANCE SPECIFICATIONS

MODELS		U51GGT-1000 Series
INSTALLATION		Front Mount or Trunk Mount
FREQUENCY		25-54 mc
TRANSMITTER RF POWER OUTPUT		50 watts minimum
TRANSMITTER MODULATION		40F3: ±15 kc for 100% at 1000 cps or 20F3: ± 5 kc for 100% at 1000 cps
RECEIVER SENSITIVITY		Less than 0.3 microvolt for 20 db quieting 50 ohms RF input impedance
RECEIVER SELECTIVITY		-100 db at ±15 kc (20 kc channel spacing) -100 db at ±32 kc (40 kc channel spacing)
RECEIVER MODULATION ACCEPTANCE		± 5 kc (20 kc channel spacing) ±15 kc (40 kc channel spacing)
METERING		Chassis mounted metering sockets on the transmitter and receiver facilitate convenient metering of all circuits essential to tuning and checking. A MOTOROLA portable test set or a 0-50 microampere meter can be used for this purpose.
INPUT VOLTAGE		12 VDC Positive or Negative Ground
CURRENT DRAIN (TOTAL)	Standby	6.1 amps
	Transmit	16 amps
INTERMITTENT DRAIN		Each crystal heater: 0.65 amps
POWER SUPPLY		Fully transistorized
WEIGHT		Approximately 47 lbs. (including accessories)
DIMENSIONS		Trunk Mount: 6" high x 9-7/8" wide x 19-1/4" long overall Front Mount: 6" high x 9-7/8" wide x 20-3/4" long overall

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

FCC LICENSE DESIGNATION: CC1008

FOREWORD

NOMENCLATURE

Motorola mobile radio equipment is packaged as a radio set plus accessories. The radio set is specifically identified by the model number on the nameplate.

NOTE

Be sure to use the entire model number when making inquiries about your equipment.

The accessories are identified by an accessory group number which includes the other items essential to completing the radio installation such as; antenna, cables, etc. Use this number when referring to a specific group of accessories.

Identifiers have been assigned to chassis and kits. Use these identifiers when requesting information or ordering replacements.

Radio set and accessory groups charts are located in the front of this manual.

PRODUCTION CHANGES

When production and engineering changes are incorporated into the equipment, a revision numeral is assigned to the chassis or kit affected.

Typical Example:

A Model TTD1090AA Transmitter becomes TTD1090AA-1 with the first revision.

This chassis number complete with revision numeral, if any, is stamped on the chassis at the time of production. The revision numeral becomes an integral part of the chassis identifier.

A schematic diagram number complete with its issue letter is also stamped on each chassis. This establishes direct correlation between the chassis and its schematic. The schematic issue is advanced each time a change occurs in the chassis.

INSTRUCTION MANUAL REVISIONS

Changes which occur after an instruction manual is printed are described in the Instruction Manual Revisions. These bulletins give the reader complete information on the change including pertinent parts listing data.

NATIONAL SERVICE ORGANIZATION

Motorola provides a nation-wide service organization. Through its maintenance and installation program Motorola makes available the finest service to those desiring reliable continuous communications on a contract basis.

The largest service organization specializing in mobile communications is Motorola's National Service Organization. Over 800 strategically located, adequately staffed and trained, independently owned and operated stations, manned with several thousand FCC licensed personnel constitute the sub-contracting force.

The administrative forces of area and district service managers and district service representatives are in the direct employ of Motorola.

For your contract service requirements, please contact your local Motorola representative or write to:

National Service Manager
Motorola Communications Division
4501 W. Augusta Blvd., Chicago 51, Illinois

REPLACEMENT PARTS ORDERING

Motorola maintains parts and service depots and authorized service stations strategically located through the country. These facilities are fully equipped to give the finest service.

When ordering replacement parts, the complete number identification of the item must be used whether it be a component, kit or complete chassis. This will fix proper identification and insure receipt of the desired item. Complete number identification should also be used when requesting equipment information.

Crystal orders should specify crystal type number, crystal frequency, carrier frequency and the chassis model number in which the crystal is to be used.

Orders for "Vibrasender" and "Vibrasponder" units should specify the type number and frequency and should identify the owner and operator of the communications system in which these items are to be used.

CAREFUL USE OF THE INSTRUCTION MANUAL AND THE MANY SUGGESTIONS CONTAINED IN IT WILL FURTHER INSURE PROPERLY INSTALLED AND MAINTAINED RADIO EQUIPMENT.

THE EQUIPMENT DESCRIBED IN THIS MANUAL IS MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING MOTOROLA U. S. PATENTS:

	2,608,648	2,743,144	2,833,994	2,963,577
RE-24,110	2,608,649	2,743,361	2,834,879	2,966,585
RE-24,815	2,626,384	2,750,451	2,835,794	2,968,739
2,404,359	2,637,782	2,759,052	2,852,730	2,974,221
2,439,408	2,650,333	2,759,103	2,860,239	2,984,740
2,439,412	2,662,942	2,770,721	2,883,521	2,994,844
2,472,021	2,688,059	2,777,950	2,888,652	3,009,115
2,524,300	2,691,094	2,784,263	2,899,547	3,014,127
2,524,534	2,691,560	2,799,001	2,901,601	3,027,454
2,547,023	2,699,425	2,799,010	2,912,573	3,027,455
2,547,025	2,705,281	2,808,507	2,918,571	3,039,081
2,547,027	2,731,555	2,809,236	2,924,705	3,041,550
2,566,759	2,738,466	2,810,068	2,925,562	3,048,659
2,583,032	2,740,891	2,830,200	2,938,082	3,048,747
2,602,842				3,059,184

Other U. S. Patents Pending.

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MOTOROLA

MODEL CHART
RADIO SET

CARRIER SQUELCH "T POWER" MODELS

25 - 54 MC 12VDC OPERATION

CODE:

- [X] = ITEM INCLUDED IN RADIO SET
- ◰ = ITEM INCLUDED WITH ORDERS FOR FIVE (OR LESS) RADIO SETS
- ◪ = ALTERNATE ITEMS DEPENDING UPON FREQUENCY RANGE
- [2] = TWO ITEMS SUPPLIED

*REPRESENTS A SERIES OF MODELS AND NOT A SPECIFIC MODEL. THE SPECIFIC MODEL, AS STAMPED ON THE CHASSIS, IS DETERMINED BY ITS APPLICATION.

MODEL	NO. OF RCVR. FR.	NO. OF XMTR. FR.	CHANNEL SPACING	ACCESSORY GROUPS
U51GGT-1000A	1	1	40 KC	DA, DB, DE OR DF
U51GGT-1010A	1	2	40 KC	DA, DB, DE OR DF
U51GGT-1030A	2	2	40 KC	DA, DB, DE OR DF
U51GGT-1100A	1	1	20 KC	DA, DB, DE OR DF
U51GGT-1110A	1	2	20 KC	DA, DB, DE OR DF
U51GGT-1130A	2	2	20 KC	DA, DB, DE OR DF

ITEM	DESCRIPTION	REFERENCE DIAGRAM	U51GGT-1000A	U51GGT-1010A	U51GGT-1030A	U51GGT-1100A	U51GGT-1110A	U51GGT-1130A
*TRB1080AA/TA235W	RECEIVER, 1-FREQUENCY, 40 KC CHANNEL SPACING (25-54 MC)	63E854952	X					
*TRB1080AC/TA235W-R2	RECEIVER, 2-FREQUENCY, 40 KC CHANNEL SPACING (25-54 MC)	63E854953		X				
*TRB1080AB/TA235S	RECEIVER, 1-FREQUENCY, 20 KC CHANNEL SPACING (25-54 MC)	63E854952			X			
*TRB1080AD/TA235S-R2	RECEIVER, 2-FREQUENCY, 20 KC CHANNEL SPACING (25-54 MC)	63E854953				X		
*TTB1030AA/TA234	TRANSMITTER, 1-FREQUENCY (25-54 MC)	63E854612					X	
*TTB1030AB/TA234-C2	TRANSMITTER, 2-FREQUENCY (25-54 MC)	63E854612			X			X
TU588	POWER SUPPLY	63E856462	X	X	X	X	X	X
TK603	SUB-PANEL KIT		X	X	X	X	X	X
TK661	FRONT PANEL KIT		X	X	X	X	X	X
K-9045	HOUSING		X	X	X	X	X	X
K-9322	TUNING TOOL KIT		◰	◰	◰	◰	◰	◰
RN3-A	TRANSMITTER CONTROL CRYSTAL		[2]	[2]	[2]	[2]	[2]	[2]
RM14A/RP14A	RECEIVER CONTROL CRYSTAL (25-40 MC)		X	X	X	X	X	X
RM15A/RP15A	RECEIVER CONTROL CRYSTAL (40-54 MC)		X	X	X	X	X	X
G04	RECEIVER 1-F CRYSTAL		X	X	[2]	X	X	[2]
TLN6155A	FILTER KIT, 2-FREQUENCY				X			X

EPD-1233-E

MOTOROLA

MODEL CHART

ACCESSORY GROUPS

CARRIER SQUELCH "T-POWER" MODELS
25-54 MC 12VDC OPERATION
50 WATT RF POWER

CODE:

☒ = ITEM INCLUDED

◪ = ALTERNATE ITEM DEPENDING UPON FREQUENCY RANGE

GROUP NUMBER	TYPE OF INSTALLATION	NO. OF FREQ'S	CONTROL HEAD	MICRO-PHONE	SPEAKER
DA1100D	REAR-MOUNT	ONE	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DA1101D	REAR-MOUNT	ONE	"WIRED-IN" MIC.	SUPPLIED	POWER VOICE
DA1105C	REAR-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DA1106C	REAR-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DA1110D	REAR-MOUNT	TWO	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DA1111D	REAR-MOUNT	TWO	"WIRED-IN" MIC.	SUPPLIED	POWER VOICE
DA1115C	REAR-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DA1116C	REAR-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DB1100D	FRONT-MOUNT	ONE	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DB1105C	FRONT-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DB1106C	FRONT-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DB1110D	FRONT-MOUNT	TWO	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DB1115C	FRONT-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DB1116C	FRONT-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DE1005BM	REAR-MOUNT	ONE	WITH MIC. CONN.	SUPPLIED	3 OHM PM
DE1005BM	FRONT-MOUNT	ONE	WITH MIC. CONN.	SUPPLIED	3 OHM PM
DE1015BM	REAR-MOUNT	TWO	WITH MIC. CONN.	SUPPLIED	3 OHM PM
DF1015BM	FRONT-MOUNT	TWO	WITH MIC. CONN.	SUPPLIED	3 OHM PM
DA1107B	REAR-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DA1117AM	REAR-MOUNT	TWO	WITH MIC. CONN.	SUPPLIED	3 OHM PM
DB1107AM	FRONT-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DB1117AM	FRONT-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DA1100E	REAR-MOUNT	ONE	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DA1105D	REAR-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DA1106D	REAR-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DA1107CM	REAR-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DA1110E	REAR-MOUNT	TWO	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DA1115D	REAR-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DA1116D	REAR-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DA1117BM	REAR-MOUNT	TWO	WITH MIC. CONN.	SUPPLIED	3 OHM PM
DB1100E	FRONT-MOUNT	ONE	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DB1105D	FRONT-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DB1106D	FRONT-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DB1107BM	FRONT-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DB1110E	FRONT-MOUNT	TWO	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DB1115D	FRONT-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DB1116D	FRONT-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DB1117BM	FRONT-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DE1005CM	REAR-MOUNT	ONE	WITH MIC. CONN.	SUPPLIED	3 OHM PM
DE1015CM	REAR-MOUNT	TWO	WITH MIC. CONN.	SUPPLIED	3 OHM PM
DF1005CM	FRONT-MOUNT	ONE	WITH MIC. CONN.	SUPPLIED	3 OHM PM
DA1100F	REAR-MOUNT	ONE	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DA1105E	REAR-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DA1106E	REAR-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DA1110F	REAR-MOUNT	TWO	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DA1115E	REAR-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DA1116E	REAR-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DB1100F	FRONT-MOUNT	ONE	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DB1105E	FRONT-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DB1106E	FRONT-MOUNT	ONE	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DB1110F	FRONT-MOUNT	TWO	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
DB1115E	FRONT-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	3 OHM PM
DB1116E	FRONT-MOUNT	TWO	WITH MIC. CONN.	LESS MIC.	POWER VOICE
DE1005DM	REAR-MOUNT	ONE	WITH MIC. CONN.	SUPPLIED	3 OHM PM
DE1015DM	REAR-MOUNT	TWO	WITH MIC. CONN.	SUPPLIED	3 OHM PM
DF1005DM	FRONT-MOUNT	ONE	WITH MIC. CONN.	SUPPLIED	3 OHM PM

ITEM	DESCRIPTION	REFERENCE DIAGRAM
TCN6001AA	CONTROL HEAD FOR "WIRED-IN" MIC., ONE-FREQ., REAR-MOUNT	
TCN6001AE	CONTROL HEAD FOR "PLUG-IN" MIC., ONE-FREQ., REAR MOUNT	63E856475
TCN6001AB	CONTROL HEAD FOR "WIRED-IN" MIC., TWO-FREQ., REAR MOUNT	
TCN6001AF	CONTROL HEAD FOR "PLUG-IN" MIC., TWO-FREQ., REAR MOUNT	63E856475
TCN6000AA	CONTROL HEAD FOR "WIRED-IN" MIC., ONE-FREQ., FRONT MOUNT	
TCN6000AE	CONTROL HEAD FOR "PLUG-IN" MIC., ONE-FREQ., FRONT MOUNT	63E856474
TCN6000AB	CONTROL HEAD FOR "WIRED-IN" MIC., TWO-FREQ., FRONT MOUNT	
TCN6000AF	CONTROL HEAD FOR "PLUG-IN" MIC., TWO-FREQ., FRONT MOUNT	63E856474
TRN6000A	CABLE KIT, REAR MOUNT	
TRN6001A	CABLE KIT, FRONT MOUNT	
T1104-I	ANTENNA, 25-30 MC, REAR MOUNT	69D81103A78
T1104-H	ANTENNA, 30-54 MC, REAR MOUNT	69D81103A78
T1105-I	ANTENNA, 25-30 MC, FRONT MOUNT	69D81103A78
T1105-H	ANTENNA, 30-54 MC, FRONT MOUNT	69D81103A78
TU324A	3 OHM PM SPEAKER	
TU411A-12V	POWER VOICE SPEAKER	
TLN6000A	INSTALLATION KIT	
TLN6001A	MOUNTING KIT	
TLN6014A	6 TO 12 VOLT DC CONVERTER	
TKN6013A	CABLE KIT, REAR MOUNT	
TU53A	MICROPHONE	
TKN6014A	CABLE KIT, FRONT MOUNT	
TLN6425A	NOISE REDUCTION KIT	
TCN6001BA	CONTROL HEAD FOR "WIRED-IN" MIC., ONE-FREQ., REAR MOUNT	63E856684
TCN6001BE	CONTROL HEAD FOR "PLUG-IN" MIC., ONE-FREQ., REAR MOUNT	63E856684
TCN6001BB	CONTROL HEAD FOR "WIRED-IN" MIC., TWO-FREQ., REAR MOUNT	63E856683
TCN6001BF	CONTROL HEAD FOR "WIRED-IN" MIC., TWO-FREQ., FRONT MOUNT	63E856683
TMN6022A	MICROPHONE	
TAB1021A	ANTENNA, 25-30 MC., REAR MOUNT	69D81103A78
TAB1022A	ANTENNA, 30-54 MC, REAR MOUNT	69D81103A78
TAB1031A	ANTENNA, 25-30 MC, FRONT MOUNT	69D81103A75
TAB1032A	ANTENNA, 30-54 MC, FRONT MOUNT	69D81103A75
TAB1021B	ANTENNA, 25-30 MC, REAR MOUNT	
TAB1022B	ANTENNA, 30-54 MC, REAR MOUNT	
TAB1031B	ANTENNA, 25-30 MC, FRONT MOUNT	
TAB1032B	ANTENNA, 30-54 MC, FRONT MOUNT	

EPD-6537-C

DESCRIPTION

1. INTRODUCTION

The MOTOROLA T-POWER mobile FM two-way radio sets incorporate several design features which reduce maintenance and provide full interchangeability between front and rear mount radio sets. These features are:

(1) transistorized power supply

(2) interchangeable radio set drawer assembly

(3) "plug-in" control head

a. Transistorized Power Supply

The MOTOROLA fully transistorized power supply uses long-life power transistors in place of conventional vibrator units. The transistorized supply provides operating voltages for both transmitter and receiver. The use of transistors eliminates the cost of replacing vibrators and improves overall operation of the radio set.

b. Interchangeability

The radio set housing mounts either under the vehicle dash or in the trunk of the car. The same drawer assembly, including transmitter, receiver and power supply, slides into the housing in either type of installation. In mobile radio fleets where both front- and rear-mount installations are used, this design provides full flexibility of exchange between vehicles. Rear mount radio sets are remotely controlled by means of a dash-mounted control head. The drawer assemblies can be interchanged between vehicles with positive or negative ground electrical systems.

c. Plug-In Control Head

In dash-mount installations the control head plugs into a receptacle on the front of the radio set drawer assembly. Two lockscrews secure it in place. In trunk-mount installations the control head mounts on the vehicle dash and a cable kit makes the connections between the control head and the receptacle on the front of the radio set. Thus, the same radio set drawer assembly can be easily exchanged between front and rear-mount housings.

2. GENERAL DESCRIPTION

a. T-POWER "Radio Set"

The basic radio set consists of a transmitter, receiver, power supply and housing. The transmitter, receiver and power supply are assembled together to form a drawer unit which slides into the housing. External connections are made through receptacles on the front of the housing. The radio set can be installed either under the dash (front) or in the trunk (rear) of the vehicle.

Various T-POWER models are available, providing either one or two-frequency transmitters, and with either 20 kc or 40 kc channel spacing receivers. The radio set cross reference chart, which precedes this section of the manual, shows the available models and summarizes the equipment supplied with each variation.

b. Accessory Groups

In addition to the basic radio set, an "accessory group" is required to complete the installation. The accessory group includes the control

head, cable kit, antenna, mounting hardware and other required items. Accessory groups are classified for either rear-mount or front-mount installations.

(1) Rear-Mount Accessory Groups

Rear-mount accessory groups include a control head designed for mounting on the vehicle dash and a cable kit for interconnecting the radio set and control head. Control heads are available either with or without microphones. Models supplied less microphone have a four-pin receptacle for connecting a detachable microphone or handset. Models supplied with microphone have a palm-type microphone wired-in at the factory. Rear-mount accessory groups include either a 3-ohm permanent magnet speaker or the new MOTOROLA POWER-VOICE speaker with built-in booster amplifier. This speaker provides an audio output of 15 watts from the normal radio set receiver output.

Accessory groups are listed in the accessory group cross reference chart in the front of this manual.

(2) Front-Mount Accessory Groups

Front-mount accessory groups include a plug-in control head which mounts directly on the radio set front panel. These control heads are available for use with detachable microphones or complete with factory wired-in microphones as described for rear-mount control heads. The accessory group includes either a 3-ohm PM speaker or the new MOTOROLA 15-watt POWER VOICE speaker with built-in transistorized audio amplifier.

These accessory groups are listed in the accessory group cross reference chart at the front of this manual.

3. DESCRIPTION OF RADIO SET ITEMS

The items included in the radio set are summarized on the model chart at the front of this manual. Major units, such as the receiver, transmitter and power supply are fully described in the various sections of this manual, as indicated in the table of contents. Items not covered in separate sections are described in the following paragraphs.

a. Sub-panel Kit

The TK603 Sub-panel Kit is used with the radio sets covered in this manual. This kit includes the front and rear tie-plates and the hardware required to assemble the transmitter, receiver and power supply into a single mechanical unit. This three chassis assembly then slides into the housing as a drawer unit. The power supply connector mounts on the front sub-panel of this kit, making the receptacle available for an external mating plug. A coaxial cable which interconnects the receiver r-f circuit to the antenna relay is also included with this kit.

b. Housing

The 50 watt T-POWER radio sets are housed in the K-9045 Housing. This housing is 9-7/8 inches wide x 18-1/2 inches deep x 6 inches high. The housing is a heavy gauge steel cabinet designed to house the receiver, power supply and transmitter assembly as a drawer unit. The housing is finished in an automotive type baked enamel. Housing tops are removable for access to components mounted on the chassis.

c. Front Panel

The TK661 Front Panel forms the exterior front panel of the drawer unit. This panel includes an extruded aluminum heat radiator and the two power transistors used with the power supply. A chrome-plated bar on this panel is a carrying handle when pulled up and outward. Spring catches on the heat radiator fins secure the handle when not in use. A key-lock mounted on this panel secures the radio set against unauthorized personnel. Metering ports give access to the transmitter and receiver meter sockets. The 19-pin power supply receptacle is accessible through a hole in this panel. The antenna receptacle for the radio set is mounted on this panel. A coaxial cable connects this receptacle to the ANT. receptacle on the transmitter chassis.

d. Crystals

The crystals used in the radio set are listed in the radio set cross reference chart at the front of this manual. If crystals are re-ordered refer to the REPLACEMENT PARTS ORDERING paragraph in the FOREWORD of this manual.

e. Alignment Tool Kit

The K-9322 Alignment Tool Kit is included with the radio set at the rate of one kit per five sets (or less, if less than five are ordered). This kit includes the tool required for aligning the transmitter and receiver.

4. DESCRIPTION OF STANDARD ACCESSORIES

a. Cable Kits

Cable kits are not supplied as part of the radio set model, but are included in the accessory group, which must be ordered separately for each type of installation. The type of cable kit used depends upon front or rear mount installation and upon one-frequency or two-frequency operation. The cable kits available are listed in the accessory chart.

b. Installation Kit

The installation kit includes cable clamps and mounting hardware for installing the radio sets. It is used for front and trunk mount models.

c. Antennas

The spring base antennas are designed for 25-54 mc mobile radio installations. The antenna consists of a 1/4 wave-length stainless steel rod, a universal spring base swivel mount and a coaxial lead-in cable. Antenna rods are cut to length at the factory for specific frequencies. The front mount antennas have a 5-ft. lead-in; the rear mount antennas have a 20-ft. lead-in.

d. Speaker

The TU324A Trunnion Mount Speaker is designed for mounting on a suitable flat surface in the vehicle. It can be mounted directly on the fire wall or dashboard. It can be mounted on the steering column when the TK395 Adapter Kit is used. The unit consists of a 3-ohm, 5 inch PM speaker installed in a louvered steel housing. An eight-foot, 2-conductor cable is included.

e. POWER-VOICE Speaker

The Model TU433A-12V POWER VOICE Speaker is a combination speaker and transistorized audio amplifier in a louvered steel housing. Two power transistors in a transformer-coupled, push-pull circuit boost the receiver audio output to a 15-watt level with less than 10% distortion. This unit is especially desirable for all high ambient noise applications or where the receiver must be monitored at some distance from the vehicle.

f. Control Heads

The control head provides the required control facilities for operation of the radio set. Two basic models are available for front mount radio sets and two are available for rear mount models. Model variations include one or two-frequency operation and "wired-in" microphone or provisions for detachable microphone.

Front-mount models are designed for direct plug-in connection to the radio set front panel. Control heads for rear-mount models are mounted on the vehicle dash with an adjustable angle bracket.

Refer to the intercabling diagrams in this instruction manual for wiring details of the control heads.

S1059A PORTABLE TEST SET

For testing and alignment of Motorola transmitters and receivers. Cable and plug mate with METER sockets on radio chassis

SPECIAL PURPOSE KITS

K-7257 Extension Cable. Provides full length ground return from rear-mount radio set to battery. Consists of two 17-foot lengths No. 4 cable with lugs at each end.

P-7208 WATTMETER DUMMY LOAD
Used with portable test set to measure transmitter r-f power output.

Long Cable Kits. For limousine and truck installations. With 20-ft cables instead of 17-ft cables. Fully interchangeable.

TMN6023A MICROPHONE

The TMN6023A is a weatherproofed version of the TMN6022A Microphone. It contains a built-in transistorized pre-amplifier and moving coil element for improved voice reproduction.

TMN6006B TELEPHONE HANDSET

This handset is interchangeable with the TMN6022A and TMN6023A Microphones. It contains a conventional magnetic receiver cartridge and dynamic transmitter cartridge with built-in pre-amplifier. A push-to-talk switch is located in the handset handle.

INSTALLATION AND OPERATION

INSTALLATION

Installation instructions are packed and shipped with the radio set accessories. Comprehensive instructions for reduction of ignition noises are supplied with the Noise Reduction Kit.

OPERATION

1. PRE-OPERATIONAL CHECKS AND ADJUSTMENTS

a. Purpose

The purpose of the pre-operational check is to ascertain that the mobile radio set is operating properly when initially placed in service.

The equipment has been accurately aligned at the factory for optimum performance. It is possible, however, that mishandling in transit may have disturbed some of the adjustments. It is essential, therefore, that a pre-operational check be made to assure proper operation when the equipment is installed.

b. Pre-Installation Bench Check

The radio set can be checked before installation using a bench test set-up with permanently installed cabling and control facilities and a battery or battery eliminator. The dc supply must be a 12-volt source. An antenna dummy load, rf wattmeter or operational antenna must be connected to the radio set ANTENNA connector on the front panel. A test set for metering the transmitter and receiver should be available. This type of laboratory set-up is particularly useful where many sets must be checked, however, it does not give a complete check of the actual cables, control unit and speaker to be used.

The ideal set-up for a pre-installation check is a bench test in which the radio set, cable kit, control head, speaker and antenna are assembled to form a complete facsimile of the vehicular installation. The pictorial cabling diagrams in the installation instructions packed with the cable kit show how to interconnect the various items.

Once the test set-up is assembled the equipment can be turned on and operated as described in the following paragraphs.

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c. Installation Checks

Before placing this radio set in operation make the following installation checks:

(1) General

Be sure all cable connections and bolted connections are secure. Make sure all fuses are in place and all tubes are firmly seated.

(2) DC Input

(a) Be sure the equipment is connected with the proper polarity to a 12-volt dc electrical system. Set the ON-OFF toggle switch to the ON position. This applies the dc input to the radio set.

(b) The green pilot lamp should be lit and all tube filaments should be energized. To check filaments, unlock the drawer assembly and slide the drawer out or lift the top of the housing. After making this check keep the radio set open for the following checks.

(3) Check Receiver

(a) Meter Readings

Check receiver meter readings against the STAGE MEASUREMENT CHART in the RECEIVER section (noise input readings only). Use the Motorola portable test set or equivalent 0-50 microamp. test meter. The cable of the portable test set plugs directly into the metering socket of the receiver chassis. Check meter readings in the various test positions as indicated on the chart. If any of the readings are beyond the given limits, re-align the receiver as described in the RECEIVER section.

(b) Check for Normal Operation

With the receiver properly aligned, the dc input applied to the equipment and the antenna connected, the receiver should be in full operation. Check for proper operation as follows: Turn the VOLUME control to the full clockwise position. Turn the SQUELCH control to the full counterclockwise position (open). You should hear either a loud, rushing noise in the speaker or signals from any on-frequency station which may be on the air at this time. In the absence of any received signals the loud, rushing noise is a normal indication of receiver operation with "open" squelch.

(c) To Set the VOLUME Control

There are two controls involved in adjusting the audio level to the speaker. These controls must be adjusted in the presence of a normal, fully deviated signal from the base station transmitter (or other mobile located at an average distance). To adjust these controls proceed as follows:

With a signal being received, set the VOLUME control on the control head to maximum volume (fully clockwise). Then adjust the audio level control on the receiver chassis to a setting just below the point where distortion becomes audible. Now, reset the control head VOLUME control for the desired listening level.

The use of two controls in the audio circuits permits future readjustment of the speaker level at the control head without resetting the receiver audio level control.

(d) To Set the SQUELCH Control

Turn the SQUELCH control in the clockwise direction until the noise is squelched (cuts out).

(4) FCC Regulations

The operation of the transmitter in this radio set is covered by FCC rules and regulations. Several provisions of these rules are briefly summarized in this paragraph. For complete information, refer to the current FCC regulations covering the applicable type of service and equipment. FCC regulations excerpts:

(a) Transmitter frequency and deviation must be checked before a transmitter is placed in service and at least every year thereafter. A suitable procedure shall be employed to ascertain that the transmitter is on the assigned carrier frequency and that the transmitter crystal actually controls the frequency of the radiation. Modulation deviation is limited to ±15 kc for 40 kc channel spacing operation and to ±5 kc for 20 kc channels.

(b) The rf power output of a transmitter shall be no more than required for satisfactory technical operation considering the area to be covered and the local conditions.

(c) Only persons holding a 1st or 2nd class commercial radiotelephone operator's license or personnel working directly under their immediate supervision may tune or adjust a radio transmitter.

(5) Check Transmitter

(a) Operational Check

The transmitter must be checked for proper operation before the equipment can be placed in service. Connect a dummy load lamp, rf wattmeter or the regular mobile radio set antenna to the ANTENNA receptacle on the front panel. Set the HI-LO switch on the power supply chassis to the HI position. Press the microphone push-to-talk button momentarily and listen for relay operation. The transmit-receive relay on the power supply chassis and the antenna relay on the transmitter chassis must operate. Check for indication of rf power output. The dummy load lamp should glow or the rf wattmeter, if used, will show the rf power output. If the regular mobile antenna is used, the transmitter should radiate signals to receivers of other sets on the same frequency.

CAUTION

Do not key the transmitter more than a few seconds at a time while making these operational tests.

If the operational test is satisfactory, proceed to the next step. If there is no indication of rf output, some troubleshooting must be done before proceeding. The simplified functional diagram in this section shows the overall operation of the radio set and gives the step-by-step sequence of operations. The intercabling diagrams trace the various circuits from chassis-to-chassis. Schematic diagrams of each chassis are included in the various sections of the manual. With these diagrams, the technician can understand how the radio set works and can isolate troubles to a specific chassis or stage thereof.

(b) Meter Readings

Refer to the alignment procedure in the TRANSMITTER section of this manual. With the HI-LO switch in the HI position check meter readings against the values given in the FINAL METER READINGS CHART. The transmitter must be keyed to obtain readings. Use the microphone push-to-talk button or the switch on the Motorola portable test set. To check readings consult the chart and set the switch to a given position. Then key the transmitter just long enough to observe the reading. Readings can be taken in any order. If the readings in positions 2, 3, 4, 5 or 6 are below the minimum values given, re-align the transmitter as described in the alignment procedure. The reading in the PA position is not too important at this point, however, if it is above the maximum value given, do not key the transmitter any more than absolutely necessary.

It is advisable to follow the complete alignment procedure at this point, since the next step requires a repeak of the transmitter adjustments to obtain full rf output.

(c) Loading to Antenna

Set the HI-LO switch to LO and load the transmitter to the antenna as described in the last three steps of the alignment procedure.

d. Deviation Check

FCC regulations require a deviation check before a transmitter is placed in service. This check is described in the TRANSMITTER section.

2. OPERATOR'S INSTRUCTIONS

a. To Turn "ON" Equipment:

Place the ON-OFF switch in the ON position. The green indicator will become illuminated. The receiver is now in full operation and the transmitter filaments are "on".

NOTE

If multi-channel transmitter and/or receiver is used, place frequency selector switch in desired frequency position.

b. To Receive:

(1) Turn the VOLUME control to the full clockwise position.

(2) Turn the SQUELCH control to the full counterclockwise position.

(3) Adjust the SQUELCH control, by turning the control slowly clockwise until the noise is just squelched (cuts out). Turning the control beyond this point will increase the minimum signal necessary to open the squelch circuit.

(4) Set the control head VOLUME control to the desired speaker level with a received signal.

c. To Transmit:

(1) Remove the microphone from the hanger bracket and press the push-to-talk button. The red indicator lamp will become illuminated, indicating the transmitter is "on". If a military or noise cancelling type microphone is used, hold the microphone at approximately a 30° angle from the lips and speak clearly and distinctly across the microphone in a normal or loud voice. If a handset microphone is used, speak directly into the mouthpiece of the handset. The TRANSMITTER CANNOT BE OVER-MODULATED BY SPEAKING LOUDLY.

(2) To receive reply, release the push-to-talk button. The red indicator lamp will go "off" indicating that the transmitter circuits are no longer energized. The received reply may now be heard over the speaker and/or the handset earpiece (if used).

(3) When the transmission is completed, release the push-to-talk button and hang the microphone on the hanger bracket.

d. To Turn "OFF" the Equipment:

Place the ON-OFF switch in the OFF position. The green lamp will be turned "off".

3. CIRCUIT DESCRIPTION

The operation of the radio set as a whole is illustrated in the simplified functional diagram in this section. Refer first to the SEQUENCE OF OPERATIONS table for the various steps, then to the components as identified on the diagram. The diagram applies to both front-mount installations and rear-mount installations. The only differences between these two types of installations are in the control head and dc input circuit. The power supply, transmitter and receiver are the same for both installations.

Once the simplified diagram is clearly understood refer to the POWER SUPPLY section of this manual for full information on the transistor multivibrator and relay action. For detailed description of the transmitter and receiver, refer to the TRANSMITTER and RECEIVER sections. For exact intercabling connections between the various chassis, refer to the intercabling diagrams in this section.

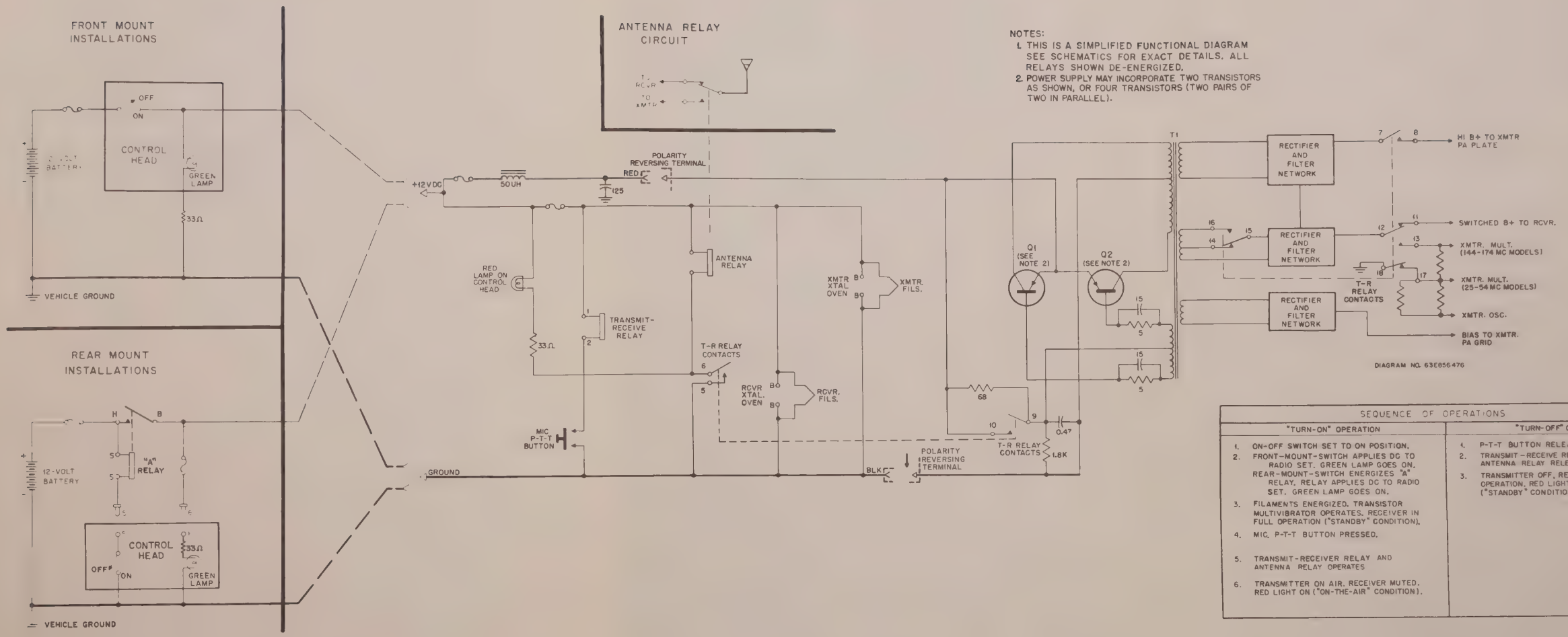


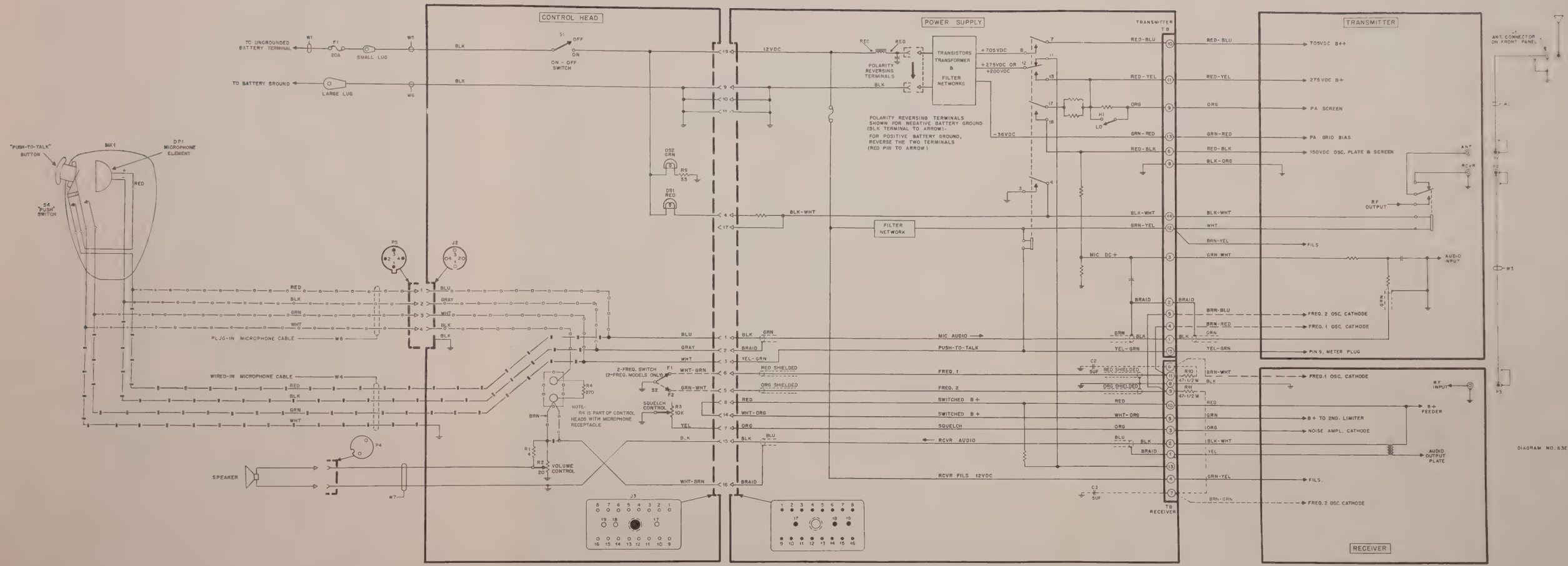
DIAGRAM NO. 63E856476

NOTES:
1. THIS IS A SIMPLIFIED FUNCTIONAL DIAGRAM SEE SCHEMATICS FOR EXACT DETAILS. ALL RELAYS SHOWN DE-ENERGIZED.
2. POWER SUPPLY MAY INCORPORATE TWO TRANSISTORS AS SHOWN, OR FOUR TRANSISTORS (TWO PAIRS OF TWO IN PARALLEL).

SEQUENCE OF OPERATIONS

"TURN-ON" OPERATION	"TURN-OFF" OPERATION
1. ON-OFF SWITCH SET TO ON POSITION. 2. FRONT-MOUNT-SWITCH APPLIES DC TO RADIO SET. GREEN LAMP GOES ON. REAR-MOUNT-SWITCH ENERGIZES "A" RELAY. RELAY APPLIES DC TO RADIO SET. GREEN LAMP GOES ON. 3. FILAMENTS ENERGIZED. TRANSISTOR MULTIVIBRATOR OPERATES. RECEIVER IN FULL OPERATION ("STANDBY" CONDITION). 4. MIC. P-T-T BUTTON PRESSED. 5. TRANSMIT-RECEIVER RELAY AND ANTENNA RELAY OPERATES 6. TRANSMITTER ON AIR. RECEIVER MUTED. RED LIGHT ON ("ON-THE-AIR" CONDITION).	1. P-T-T BUTTON RELEASED. 2. TRANSMIT-RECEIVE RELAY AND ANTENNA RELAY RELEASES. 3. TRANSMITTER OFF, RECEIVER BACK IN OPERATION. RED LIGHT GOES OUT ("STANDBY" CONDITION.

Simplified Functional Diagram
Motorola No. 63E856476-C
10/11/63-RS



Front Mount Radio Sets
Intercabling Diagram
Motorola No. 63E856474-J
4/3/64-RS

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	65R4151	
		FUSE, cartridge: one time; paper 20 ampere; 250 volt; 2" long x 9/16" dia
		CONNECTOR, receptacle: fem assembly: incl mounting bracket and single contact, coaxial conn 4 contact; polarized; round molded black phenolic base; chassis mounted, incl 4S7694 LOCKWASHER: 13/16" internal 2K81180 NUT, ring
		10 cont; polarized; rectangular mtd, blk phenolic base; chassis mtd.; does not incl 7B855113 BRACKET, connector mtg, nor 61C855103 PLATE, conn mtg; bracket and plate must be ordered separately
		MICROPHONE, dynamic: palm type; contains "push-to-talk" switch; incl ref parts DP1, S4, W4
		round base-lite wafer insulator; cable mounted; connects to Transmitter Antenna Relay Antenna Connector same as P1 except connects to Transmitter Antenna Relay Receiver Connector same as P1 except connects to Receiver Antenna Connector female; 2 contact, polarized, round phenolic wafer insulator; cable mounted, does not incl 1-B855111 SHELL, connector; shell must be ordered separately male; 2 contact, polarized; round phenolic insulator; cable mounted
		spring (TMN6022A)
		4 contact, polarized (TMN6020A) SEE NOTE 1
		carbon; .107"
		wire-wound, 4 ohm; 5 w
		wire-wound; 4 ohm; 3 w
		wire-wound; 20 ohm +2-5%; 2 w
		variable; wire-wound; 10K; 2 w
		2.5 ohm; 1 w
		2.5 ohm
		47 ohm
		5A151H
		toggle; spst; does not incl 2S8382 NUT, machine; 15/32-32 x 9/16 hex; 2 req'd; nuts must be ordered separately
		401 SPDT
		push; dpst (NOT APPLICABLE on TMN6018A or TMN6023A)
		push; dpst (for TMN6018A or TMN6023A)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1V832063	LEAD, electrical: Battery to Fuseholder; incl 30K831572 CABLE, power: single conductor; #10 ga; str; ins coded BLK; 2 ft length req'd 29K832116 LUG, ring tongue: for 3/8" stud and #10 wire 29K824154 LUG, ring tongue: for #10 stud and #10 wire
W2	1V855053	LINE, RF transmission: assembly, Antenna to transmitter Antenna Relay; incl 1V855054 ASSEMBLY, cable and plug: incl 30B475378 CABLE, RF: coaxial; RG-58A/U; 6" length req'd ref part P1; ref part J1
	1K800193	Transmitter Antenna Relay to Receiver Antenna Input; incl 30B475378 CABLE, RF: coaxial; RG-58A/U; 24" length req'd ref parts P2, P3
	1V80707A65	assembly,
		CABLE, power:
	30K831572	single conductor, #10 ga str ins coded black; 9 ft, length req'd does not incl 29K824154 LUG, ring tongue; for #10 wire and #10 stud; lug must be ordered separately same as W5 except does not incl 29K832116 LUG, ring tongue; for #10 wire and 3/8" stud; lug must be ordered separately
	30A825430	2 conductor; rubber covered; each conductor; #18 ga str; 41" length req'd
		CORE, microphone:
	1V80707A58	assembly; incl P1 and the following items: 41A852707 SPRING, strain relief 29A84703L LUG, ins piercing; 4 req'd (TMN6013A & TMN6022A)
	or1V80724A28	CORD, PLUG, and SWITCH ASSY: incl P5, S4 (TMN6018A and TMN6022A)
	or 1V854040	CORD and PLUG ASSY; incl P5 (TMN6020A)

NON-REFERENCED ITEMS

The following are replaceable parts which do not appear on the intercabling diagram.

XDS1	9A859619	LAMPHOLDER: single contact; minature; bayonet base
XDS2		same as XDS1
XF1	67K892616	FUSEHOLDER: single fuse mtg rectangular porcelain base; chassis mounted; for fuse 2" long x 9/16" dia

TLN6000A Installation Kit; incl the foll items:

1V859627	Cable Clamp Kit: incl 42A19376 CLAMP, cable: 4 req'd 3S7467 SCREW, tapping; #8 x 3/8" plain hex; 4 req'd
1V849628	Mounting Hardware Kit: incl 3S125947 SCREW, tapping: #14 x 3/4" plain hex; 4 req'd 4S119331 LOCKWASHER: 1/4" split; 4 req'd

TK611 Cable Kit: incl ref parts F1, XF1, W1 and the following items:

32A880452	GASKET, fuseholder
1V474596	Mounting Hardware Kit, fuseholder: incl 4A81863 WASHER, cushion: 2 supplied 3S400465 SCREW, tapping:

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		#10 x 3/4" slotted round head; 2 supplied 4S7658 LOCKWASHER: #10 internal; 2 supplied 4S1706 WASHER: 3/8" x .203 x .033"; 2 supplied

Control Heads

Items which are common to all control [illegible] listed first. Items which are not common to all control heads are listed under the model number of the particular control head concerned.

	Items common to all control heads incl ref parts DS1, DS2, J3, P4, R1, R2, R3, R9, S1, TB1, W5, W6, W7, XDS1, XDS2, and the foll items:
2S8382	NUT, machine: 15/32-32 x 9/16" hex; 2 req'd
61B859620	LENS, indicator: RED
61K859621	LENS, indicator: GRN
4S7691	LOCKWASHER: 3/8" internal
2S8364	NUT, machine: 3/8-32 x 1/2" hex; 2 req'd
64C855103	PLATE, connector mounting (back cover)
7B855113	BRACKET, connector mounting
42A855115	CLAMP, cable
26D857812	SHIELD, indicator lamp: 2 req'd
3S122080	LOCKSCREW: 6-32 x 1/4" plain hex; 6 req'd
36B855027	KNOB, control: 2 req'd

Each control head model includes the items shown for the model, plus items listed above.

	TCN6000BA (1-freq. with "wired-in" microphone); incl the following items:
1V80720A65	MICROPHONE (ref part MK1)
38A857093	BUTTON, plug
37K106352	GROMMET, rubber; for 7/16" dia hole
	TCN6000BB (2-freq. with "wired-in" microphone); incl ref part S2 and the foll items:
1V852400	MICROPHONE (ref part MK1)
38A857093	BUTTON, plug
37K106352	GROMMET, rubber: for 7/16" dia hole
	TCN6000AE (1-freq. with receptacle for "plug-in" mic); incl ref parts J2, R4 and foll items:
4S7691	LOCKWASHER: 3/8" internal
29R5279	LUG, soldering: 7/8"
	TCN6000AF (2-freq. with receptacle for "plug-in" mic) incl ref parts J2, R4,S2 and the following items:
4S7691	LOCKWASHER: 3/8" internal
29R5279	LUG, soldering: 7/8"

Microphones

The following items are common to all microphones.

11M2506	TUBING: No. 9 BLK; 5" length req'd
3S124693	LOCKSCREW: 6-32 x 1-1/4" "Phillips" round head; 2 req'd
42A852710	STRAP; strain relief
38A852699	PUSHBUTTON

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	32A82703B01	GASKET, neoprene
	4S114201	WASHER: 1/4" x 0.156" x .015" 3 req'd
	3S127924	LOCKSCREW: 6-32 x 5/16 "Phillips" round head
	3S132436	SCREW, machine: 6-32 x 13/16"
	4S400386	LOCKWASHER: No. 6 split, 2 req'd
	42B82702B01	RETAINER, mic cartridge

The following items are peculiar to the model microphone called out.

Models TMN6013A, TMN6018A, TMN6020A, TMN6022A, TMN6023A microphones.

1V80720A94	CASE, microphone; incl hang-up stud (TMN6013A & TMN6018A)
1V80725A49	CASE, microphone; incl hang-up stud (TMN6020A, TMN6022A, & TMN6023A)
15D82701B01	COVER, microphone case (front) (TMN6013A & TMN6018A)
15D82701B05	COVER, microphone case (front) (TMN6020A, TMN6022A, TMN6023A)
1V865398	MOUNTING KIT, microphone: incl 64A85596 PLATE, mic hang-up 3S122830 SCREW, tapping: No. 8 x 1/2" slotted binder head 2 req'd

Model 1V80720A65 Microphone.

1V80720A94	CASE, microphone
15D82701B01	COVER, microphone case

NOTE:

1. P5 not replaceable on TMN6018A and TMN6023A.

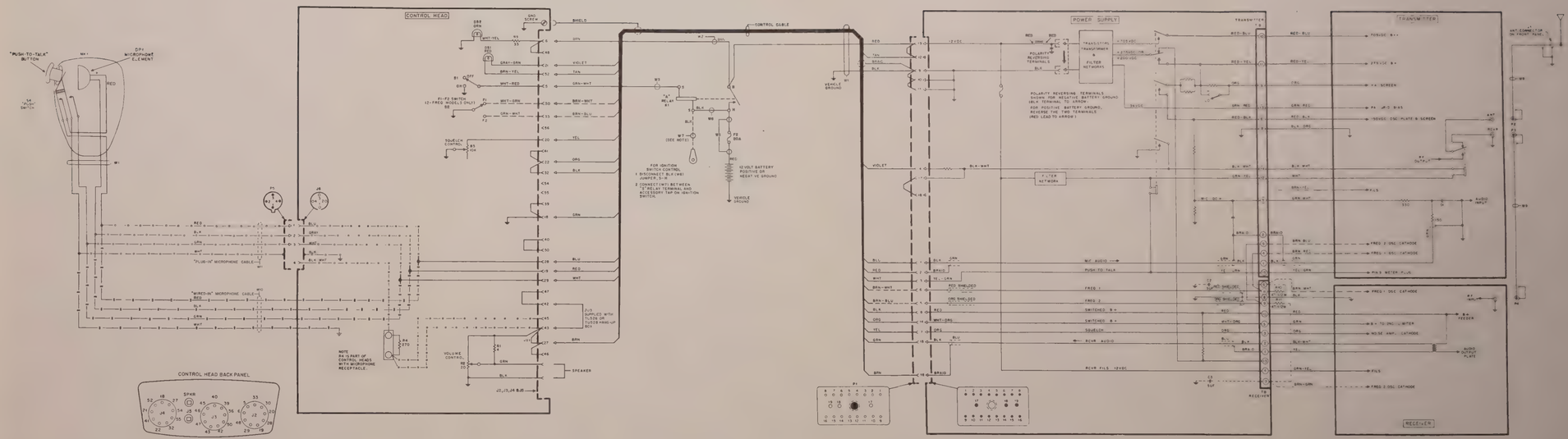
CONTROL HEAD JUMPER TABLE

CASE No.	EQUIPMENT USED*				CIRCUIT OPERATION	JUMPERS		
	MIC	HANDSET	HANG-UP BOX	QUIK-CALL UNIT		JU1	JU2	JU3
1	EITHER		---	---	Basic operation. Radio Set Speaker in circuit at all times	USED	USED	OMIT
2	---	X	X	---	Handset picked up connects audio to handset earpiece	OMIT	OMIT	USED
					Handset picked up connects audio to handset earpiece, speaker in circuit.	USED	OMIT	USED
3	X	---	X	X	Audio to speaker when microphone is removed or hung up. Alarm circuit energised. "Quik-Call" unit disabled	OMIT	USED	OMIT
4	---	X	X	X	Audio switched from speaker to handset earpiece. Alarm circuit energised	OMIT	OMIT	OMIT
					Audio switched from "Quik-Call" unit to speaker and handset. Alarm circuit energised	OMIT	USED	OMIT
5	EITHER		---	X	Quik-call unit used for alarm purposes only. Audio to speaker at all times.	USED	USED	OMIT

EPD-1516-A

X - Item used
--- - Item not used

* Mic = MM-2 & MM2A Hand-Mic. Handset = HS-2 & HS2A Hang-Up Boxes only.



Rear Mount Radio Sets
Intercabling Diagram
Motorola No. 63E8564754
10/11/63-RS

PARTS LIST for Intercabling Diagram 63E856475-L

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C2 C3	23K867671	CAPACITOR, fixed: electrolytic; tubular, 5 uf -100-10%, 50 v same as C2
DP1	59D82933C01 or59C82817C01	CARTRIDGE, microphone: transistor amplifier
DS1	65R4151	LAMP, incandescent: 6.3 volt, .2 ampere, single cont bayonet base, globular glass; type 51
DS2		same as DS1
F1		FUSE, cartridge: NOT USED
F2	65R4637	20 ampere; 32 v, 1-1/4 x 1/4
J1	1V855055	CONNECTOR, receptacle: female assembly, consisting of connector and single cont, female contact
J2, 3, 4	3B855150	Connector, polarized, round miniature bayonet coupling, miniature saddle mounting
J5	4K82810	Connector, receptacle: single cont, for mounting on marked blade, panel or insulator, chassis mounting
J6	4B16345	Connector, polarized, round miniature bayonet coupling, female, chassis mounting, with LOCK-WASHER and internal [illegible] ring
JU1, 2, 3, 4		LEAD, for three jumper. [illegible]
K1	54K41874	RELAY, armature: [illegible]
MK1	1V8[illegible]	MICROPHONE, dynamic: [illegible]
P1	(plastic shell,	CONNECTOR, plug: [illegible] TUBE, copper: No. 16 round; 1-1/2" (3-1/2" x 2") length req'd 1M9511 SLEEVE, insulating: length req'd; 3S132127 SCREW
	or (metal shell	[illegible]

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CLAMP, cable: 42A800699 CLAMP, cable: 3S73602 SCREW, machine: 6-32 x 1-1/2" slotted binder head, 2 req'd; 3B800681 SCREW, retaining: incl knurled knob; 11M9596 SLEEVE, insulating: 3/8" clear plastic tubing, 1-7/16" length req'd; 4A800671 WASHER, flat; 4A11722 WASHER "C"; 37K31648 SLEEVE, cable holddown: neoprene, 1-1/4" long
P2, 3, 4	28A474006	male; coaxial; round bakelite wafer insulator; cable mounted
P5	28A16370	male; 4 contact; polarized; incl metal shell; inc 4BK688823 SPRING, cable strain relief (TMN6013A or TMN6022A)
	or28K847092	male; 4 cont polarized (TMN6020A) (see NOTE 1)
R1	17C82177B53 or17A82212B31	RESISTOR, fixed: carbon, ±10%, 1.2 A, unless otherwise stated. Wire-wound; 4 ohm, 5 A Wire-wound; 4 ohm, 3 A
R2	18K855136	Variable: wire-wound; 20 ohm ±10%, 2 A
R3	18K855107	Variable: wire-wound; 10K; 2 w
R4	6R5550	47 ohm, 1 A
R5	17C82359A04	33 ohm, 2 A
R10, 11	6R5550	47 ohm
S1	40B855304	SWITCH, toggle: spst
S2	40A80248	toggle: spdt; does not incl 2S8382 NUT, machine: 15/32-32 x 9/16" hex; 2 req'd nuts must be ordered separately
S3		NOT USED
S4	40A823[illegible]	push: dpst (not replaceable on TMN6018A or TMN6023A
	40C822[illegible]	push: dpst (for TMN6018A or TMN6023A)
W1	1V80710A75	CABLE ASSY, special purpose incl ref part P1 and the foll items: 30C830032 CABLE: 12 cond; str ins.; leads; shielded; black plastic covered; 17 ft length req'd 29A82602D01 CONNECTOR, plug: male; single cont pin type; 12 req'd also incl protective coded "shrink" sleeving (used with pin plugs) as indicated below:

PART NO.	CODE #
37B82603D18	1
37B82603D19	1
37B82603D20	1
37B82603D21	1
37B82603D22	1
37B82603D27	1
37B82603D28	1
37B82603D29	1
37B82603D30	1
37B82603D32	1
37B82603D33	1
37B82603D52	1

also incl 42A893468 CLAMP, cable: "wrap around" strain relief 42A893464 HOOK, "S" strain relief 29A824151 LUG, slotted tongue: for #10 stud and #10 wire 1V80710A76 CABLE ASSY incl 30K831572 CABLE power single cond str ins coded BLK one 4 ft length req'd 29K832116 LUG, ring tongue for 3/8" stud and #10 wire 1V80710A77 CABLE ASSY, incl 30K813233 CABLE, power #10 ga str ins coded RED; 17 ft. length req'd 29K824154 LUG, ring tongue; for #10 stud

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
W2	1V80710A80	assy; incl 10M431 WIRE, elect #20 str ins coded BRN; 68" length req'd 29K824456 LUG, ring tongue: for #10 stud 29A82602D01 CONNECTOR, plug: pin type also incl protective coded "shrink" sleeving (used with pin plugs): 37B82603D06; coded #6
W3	1V859428	LEAD, electrical: incl 10M488285 WIRE, elect #20 ga str ins coded GRN-WHT; 68" length req'd 29A82602D01 CONNECTOR, plug; male; single cont pin type also incl protective coded "shrink" sleeving (used with pin plugs): 37B82603D05; coded #5 29K824456 LUG, ring tongue: for #10 stud and #20 wire
W4		CABLE, power: NOT USED
W5	1V80710A79	incl ref parts F2, XF2, and the following items: 30K813233 CABLE, power: single cond; #10 ga str ins coded RED; 5 ft length req'd 29K832116 LUG, ring tongue for 3/8" stud 29K824154 LUG, ring tongue for #10 stud
W6	1V859442	LEAD, electrical: Relay Jumper; incl 10M370 WIRE elect single cond; #12 ga str ins coded BLK; 4" length req'd 29K845081 LUG, slotted tongue for #10 stud and #12 wire; 2 req'd
W7	1V847414	Ignition Switch Control: incl 10M430 WIRE, elect single cond #20 ga str ins coded BLK; 6 ft length req'd 29K824456 LUG, ring tongue: for #10 stud and #20 wire 2 req'd
W8	1V855053	LINE, RF, transmission: incl 1V855054 LINE, RF transmission; incl 30B475378 CABLE RF: coaxial; RG-58A/U; 6" length req'd ref part P2 and J1
W9	1K800193	incl 30B475378 CABLE, RF: coaxial RG-58A/U; 2 ft length req'd ref parts P3 and P4
W10	1V80707A65 ("wired-in")	CORD, microphone: incl 30K852742 CORD, coiled; tinsel; 4 cond 41A852707 SPRING strain relief 11M2506 TUBING, extruded #9 BLK; 1" length req'd 29A847033 LUG, terminal; wire mounted; insulation piercing; 8 req'd
W11	1V80707A58 ("plug-in" mic.) (TMN6013A & TMN6022A)	incl 41A852707 SPRING, strain relief 29A847034 LUG, terminal; wire mounted; insulation piercing 4 req'd
	or 1V80724A28 (TMN6018A & TMN6023A)	CORD, PLUG & SWITCH ASSY; incl P5, S4
	or 1V854030 (TMN6020A)	CORD & PLUG ASSY: incl P5
		NON-REFERENCED ITEMS The following are replaceable parts which do not appear on the intercabling diagram.
XDS1, 2	9A855117	LAMPHOLDER: single cont miniature bayonet base
[illegible]		FUSEHOLDER: [illegible]

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
XF2		incl 14A82882A01 BODY, fuseholder 14A82883A02 CAP, fuseholder 42A82884A01 CONTACT, fuseholder; 2 req'd 41A82885A01 SPRING, fuseholder
		Control Heads Items which are common to all control heads are listed first. Items which are not common to all control heads are listed under the model number of the particular control head concerned.
		Items common to all control heads incl ref parts DS1, DS2, J2, J3, J4, J5, R1, R2, R3, R9, S1, TB1, XDS1, XDS2 and the following items:
	2S8382	NUT, machine: 15/32-32 x 9/16" hex; 2 req'd
	61B859620	LENS, indicator: RED
	61K859621	LENS, indicator: GRN
	4S7691	LOCKWASHER: 3/8" internal
	2S8364	NUT, machine: 3/8-32 x 1/2"hex 2 req'd
	64A857162	PLATE, conn mounting (back cover)
	3S122518	LOCKSCREW: 4-40 x 3/16" plain hex head; 2 req'd
	3S124542	LOCKSCREW: 6-32 x 3/4" plain hex head; 4 req'd
	36B855027	KNOB, control: 2 req'd
	7B855239	BRACKET, control head mounting
	1V859999	MOUNTING HARDWARE KIT: incl 4K847649 WASHER, fiber; 2 req'd 4S7670 LOCKWASHER: 1/4" internal; 2 req'd 3S129304 SCREW, machine: 1/4-20 x 1/2" slotted oven head; 2 req'd
	Each control head model includes the items shown for the model, plus items listed above.	
	1V852400 38A857093 37K106352	TCN6001BA (1-freq. with "wired-in" microphone); incl the foll items: MICROPHONE (ref part MK1) BUTTON, plug GROMMET, rubber; for 7/16" dia hole
	1V852400 38A857093 37K106352	TCN6001BB (2-freq with "wired-in microphone); incl ref part S2 and the following items: MICROPHONE (ref part MK1) BUTTON, plug GROMMET, rubber: for 7/16" dia hole
	4S7691 29R5279	TCN6001AE (1-freq with receptacle for "plug-in" mic) incl ref parts J6, R4 and the foll items: LOCKWASHER: 3/8" internal LUG, soldering: 7/8"
	4S7691 29R5279	TCN6001AF (2-freq with receptacle for "plug-in" mic) incl ref parts J6, R4, S2 and the foll items: LOCKWASHER: 3/8" internal LUG, soldering: 7/8"
	Microphones The foll items are common to all mic.	
	11M2506	TUBING: No. 9 BLK; 5" length req'd
	3S124693	LOCKSCREW: 6-32 x 1-1/4" "Phillips" round head; 2 req'd
	42A852710	STRAP; strain relief
	38A852699	PUSHBUTTON

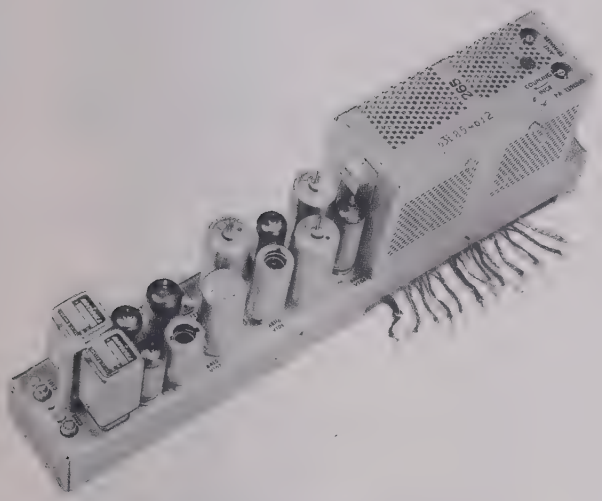
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	32A82703B01	GASKET, neoprene
	4S114201	WASHER: 1/4" x 0.156" x .015" 3 req'd
	3S127924	LOCKSCREW: 6-32 x 5/16" "Phillips" round head
	3S132436	SCREW, machine: 6-32 x 13/16"
	4S400386	LOCKWASHER: No. 6 split; 2 req'd
	42B82702B01	RETAINER, mic cartridge
	The following items are peculiar to the model microphone called out.	
	Models TMN6013A, TMN6018A, TMN6020A, TMN6022A and TMN6023A microphones.	
	1V80720A94	CASE, microphone; incl hang-up stud (TMN6013A & TMN6018A)
	1V80725A49	CASE, microphone; incl hang-up stud (TMN6020A, TMN6022A, & TMN6023A)
	15D82701B01	COVER, microphone case (front) (TMN6013A & TMN6018A)
	15D82701B05	COVER, microphone case (front) (TMN6020A, TMN6022A & TMN6023A)
	1V865398	MOUNTING KIT, microphone: incl 64A85596 PLATE, mic hang-up 3S122830 SCREW, tapping: No. 8 x 1/2" slotted binder head 2 req'd
	Model 1V80720A65 Microphone	
	1V80720A94 15D82701B01	CASE, microphone COVER, microphone case

NOTE:

1. P5 not replaceable on TMN6018A and TMN6023A.

TRANSMITTER

CE054



MODEL TTB1030AB/TA234-C2
TWO-FREQUENCY TRANSMITTER

MODEL CHART

MODEL NUMBER	NUMBER OF FREQUENCIES	CRYSTALS REQUIRED
TTB1030AA/ TA234	1	one RN3-A
TTB1030AB/ TA234-C2	2	two RN3-A

1. DESCRIPTION

The Model TTB1030AA/TA234 is an FM transmitter that operates in the 25-54 mc band. The transmitter requires a separate power supply to provide operating voltages. The r-f power output of the transmitter is 25 watts, 30 watts or 50 watts, depending upon the power supply used. The r-f carrier frequency is crystal-controlled for maximum stability.

The basic transmitter components include a crystal-controlled oscillator, an angular phase modulator controlled by the Motorola IDC ("Instantaneous Deviation Control") circuit, three stages of frequency multiplication, a final amplifier and a "T" section harmonic filter.

The Motorola IDC circuit limits the modulation deviation to 100 percent. The deviation limit is set as required for the particular channel spacing application.

The TTB1030AB/TA234-C2 is a two-frequency version of the TTB1030AA/TA234 Transmitter. This unit transmits signals on two specific crystal-controlled frequencies in the 25-54 mc band. Only one frequency can be transmitted at a time. The two-frequency transmitter is the same as the single-frequency transmitter except for the addition of a second r-f oscillator deck and control crystal. An external switch is required for changing frequencies. This switch permits either the frequency #1 or the frequency #2 oscillator to function normally while it disables the other. This is done by grounding the oscillator cathode of the stage being used. The oscillator cathode circuit of the stage not in use is left open, i.e., the ground circuit is not complete. The two-frequency switch is ordinarily incorporated into the control unit used with the transmitter.

The two-frequency transmitter can be operated on frequencies which are separated by as much as 300 kc from circuit resonance without degradation of the single-frequency performance

GUARANTEED PERFORMANCE SPECIFICATIONS

BASIC UNIT	TTB1030AA/TA234 Series (25-54 mc)
RF POWER OUTPUT	25 watts, 30 watts or 50 watts - depending upon power supply used.
CRYSTAL MULTIPLICATION	Twelve (12) times
POWER SUPPLY	Separate transistorized power supply operating from a 12 volt d-c positive or negative ground source.
SPURIOUS AND HARMONIC EMISSION	All spurious and harmonic emissions are attenuated more than 60 db below carrier level.
FREQUENCY STABILITY AND TEMPERATURE RANGE	oven type crystal unit maintains carrier within ±0.0005% of assigned center frequency from -30°C to +60°C ambient (+25°C reference)
MODULATION	36F3: ±15 kc deviation for 100% at 1000 cycles 16F3: ± 5 kc deviation for 100% at 1000 cycles
AUDIO SENSITIVITY	factory connection: 0.165 volt ±3 db for 2/3 maximum deviation at 1000 cps optional connection: 0.120 volt ±3 db for 2/3 maximum deviation at 1000 cps
TUBE COMPLEMENT AND FUNCTION	(1) 6AK6 - Oscillator (1-Freq) 6AQ5 - Doubler Driver or (2) 6AK6 - Oscillator (2-Freq) 8298 - Power Amplifier (1) 12AT7 - Mod. Buffer-Doubler 6BH6 - IDC Amplifier 6AK6 - Tripler 6AL5 - Clipper
NUMBER OF TUNED CIRCUITS	9 following the modulator including 3 double permeability tuned multiplier stages, a multiple adjusted output circuit and an output harmonic filter.
DIMENSIONS	2-3/8" wide x 5-1/4" high x 15" long
WEIGHT	3-3/4 lbs

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

specifications. The circuits of the two-frequency transmitter are normally aligned to the higher of the two carrier frequencies to be transmitted.

2. CHASSIS COMPLEMENT

The single-frequency transmitter chassis consists of the following item: One TU548 Single-Frequency Transmitter basic chassis, which includes: One TK119 Coil Kit.

The coil kit model number and the kit component parts reference symbols are assigned a letter suffix which corresponds to the frequency range of the transmitter. Component values differ for various portions of the frequency range. Refer to the schematic diagram notes for the suffix letter legend, and the parts list for a complete list of component designations.

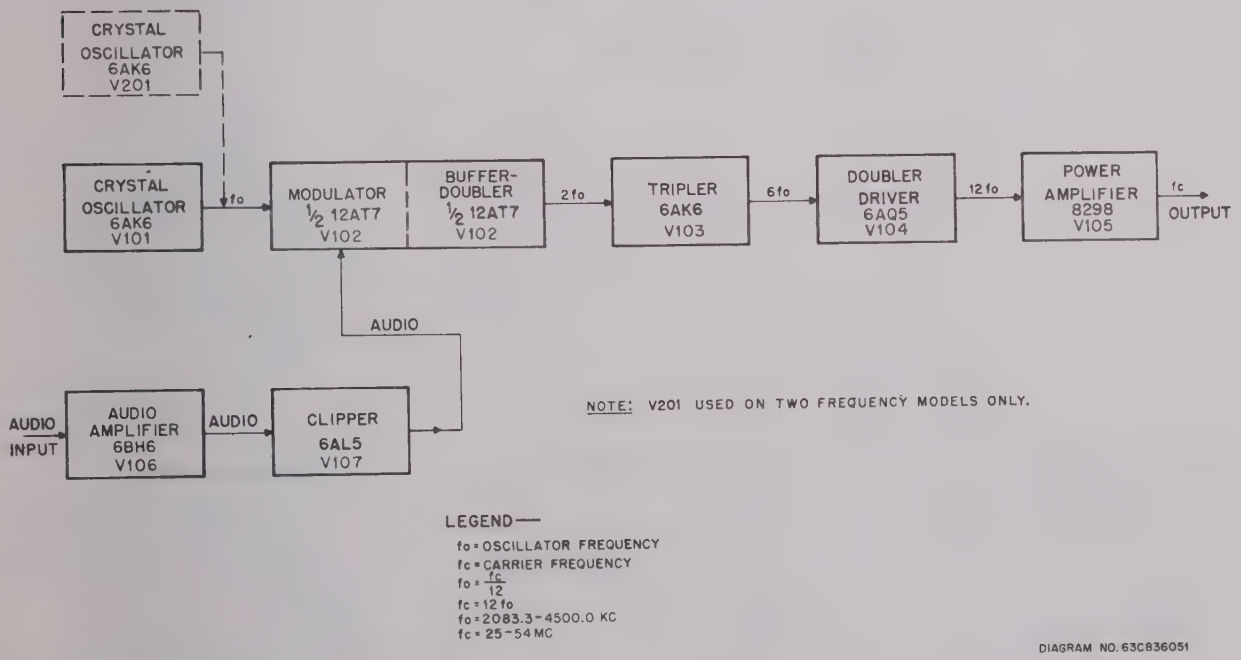
One type RN3-A Control Crystal is required for use with this transmitter. The crystal is a separate item and is not included as part of the transmitter. See the FOREWORD of this manual for ordering information.

The two-frequency transmitter chassis includes a TU548-C2 Two-Frequency Transmitter basic chassis; however, the same coil kit is used in the two-frequency model as for the single-frequency model.

Two type RN3-A Control Crystals are required for use with the two-frequency transmitter. The crystal is a separate item and is not included as part of the FOREWORD of this manual for ordering information.

3. CIRCUIT OPERATION

Stage-by-stage signal flow and operating frequencies are shown on the transmitter block diagram.



Transmitter Block Diagram

63C836051-A

a. Audio Input and Amplifier Stage

Refer to the diagram below for a simplified illustration of the audio input circuit.

(1) Circuit Paths

There are two circuit paths involved in the transmitter audio input circuit. These are: (a) microphone d-c input, and, (b) microphone audio output.

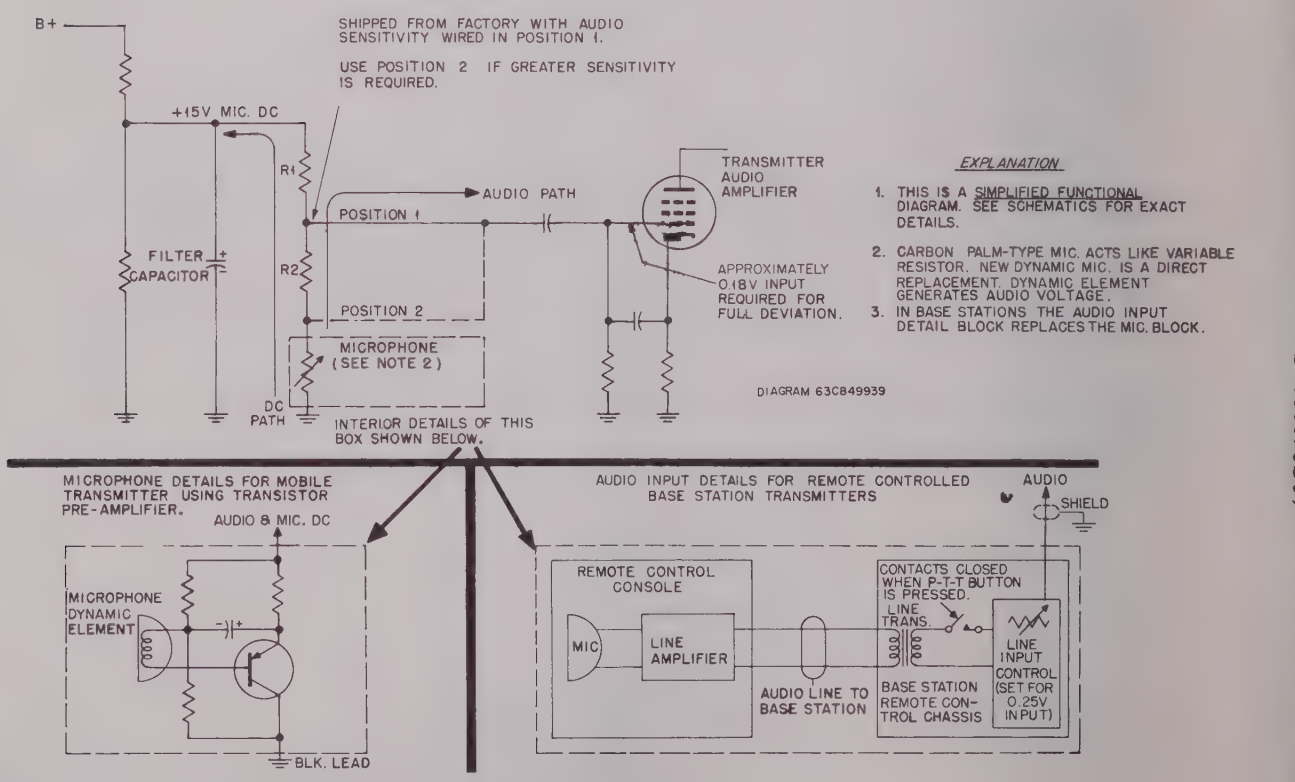
(a) Microphone DC Input

The microphone d-c input (called "talking current") is taken from a B+ voltage source in the transmitter. A resistor network drops the microphone d-c voltage to approximately 15 volts d-c. A relatively large capacitor is connected across the circuit to provide additional filtering. The d-c path leads through two resistors, R1 and R2, to the microphone. These resistors drop the voltage to about 4 volts at the microphone input. The d-c path leads through the microphone cartridge, returning to ground through the cable shield.

(b) Microphone Audio Output

The microphone acts like a voltage generator in the circuit. Sound waves received by the microphone element vary the voltage in accordance with the voice frequency and intensity. This results in voltage changes at the microphone output as a person speaks into the microphone.

There are two "audio sensitivity" positions available at the microphone output. The circuit is wired in position 1 at the factory. Using this position, reasonably loud sounds produce a 0.165 v a-c audio signal which provides two-thirds maximum deviation of the r-f carrier. If increased sensitivity is desired, position 2 can be used to provide two-thirds maximum deviation of the r-f carrier with a 0.120 v a-c audio signal.


B+
SHIPPED FROM FACTORY WITH AUDIO SENSITIVITY WIRED IN POSITION 1.
USE POSITION 2 IF GREATER SENSITIVITY IS REQUIRED.
+15V MIC. DC
R1
R2
FILTER CAPACITOR
POSITION 1
POSITION 2
AUDIO PATH
TRANSMITTER AUDIO AMPLIFIER
APPROXIMATELY 0.18V INPUT REQUIRED FOR FULL DEVIATION.
MICROPHONE (SEE NOTE 2)
DC PATH
INTERIOR DETAILS OF THIS BOX SHOWN BELOW.
EXPLANATION
1. THIS IS A SIMPLIFIED FUNCTIONAL DIAGRAM. SEE SCHEMATICS FOR EXACT DETAILS.
2. CARBON PALM-TYPE MIC. ACTS LIKE VARIABLE RESISTOR. NEW DYNAMIC MIC. IS A DIRECT REPLACEMENT. DYNAMIC ELEMENT GENERATES AUDIO VOLTAGE.
3. IN BASE STATIONS THE AUDIO INPUT DETAIL BLOCK REPLACES THE MIC. BLOCK.
DIAGRAM 63C849939
MICROPHONE DETAILS FOR MOBILE TRANSMITTER USING TRANSISTOR PRE-AMPLIFIER.
AUDIO & MIC. DC
MICROPHONE DYNAMIC ELEMENT
BLK. LEAD
AUDIO INPUT DETAILS FOR REMOTE CONTROLLED BASE STATION TRANSMITTERS
AUDIO
SHIELD
REMOTE CONTROL CONSOLE
MIC
LINE AMPLIFIER
AUDIO LINE TO BASE STATION
CONTACTS CLOSED WHEN P-T-T BUTTON IS PRESSED.
LINE TRANS.
BASE STATION REMOTE CONTROL CHASSIS
LINE INPUT CONTROL (SET FOR 0.25V INPUT)

Simplified Audio Input

63C849939-C

The microphone audio output is connected through a coupling capacitor to the grid of the transmitter audio amplifier. The signals are then passed through the IDC circuit and used to modulate the transmitter.

(2) Microphone and Audio Input Details

The boxed-in detail in the lower left hand side of the diagram shows the mobile transmitter application. This is an enlarged drawing of the microphone shown in the upper half of the diagram. The audio output shown in the detail connects to the lower end of R2, the same as shown for the microphone output.

The dynamic microphone incorporates a transistorized pre-amplifier which brings the output up to the 0.165 volt level. The microphone d-c input supplies the current for energizing the transistor.

b. IDC Circuit

To trace the IDC circuitry refer to schematic diagram 63E854612 which is part of this section.

The incoming signals from the audio amplifier, are coupled to the clipper tube. The clipper stage limits the amplitude of the signals which pass on to the modulator stage. The clipping level is set so that some clipping of peaks will occur in the normal input signal. Signals applied to the clipper below the clipping level are unaffected by the clipper; signals which exceed the clipping level are clipped at the top and bottom. A small amount of clipping produces a trapezoidal waveform; a large amount of clipping produces a square wave (see figure 1).

The clipper output is integrated, producing an approximately triangular waveform. The approach to the triangular shape depends upon the amount of clipping; the more clipping, the nearer the output approaches the triangular form.

The integrating network has the additional function of limiting signal amplitude in proportion to signal frequency. As the frequency increases, the amplitude is reduced in proportion.

The integrator output is amplified and applied to the IDC control, which limits the amplitude of the signals which reach the modulator.

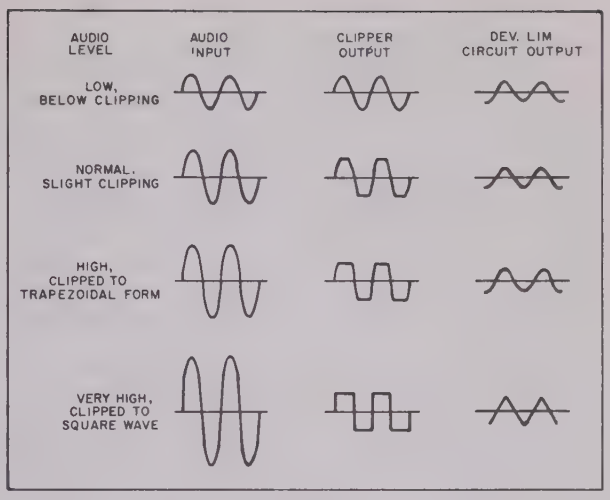


Figure 1.
Effect of Clipper and Integrator on Sine Waves of Different Amplitudes

The IDC control limits deviation by controlling the maximum slope (or steepness) of the signal wavefront which reaches the modulator (see figure 2).

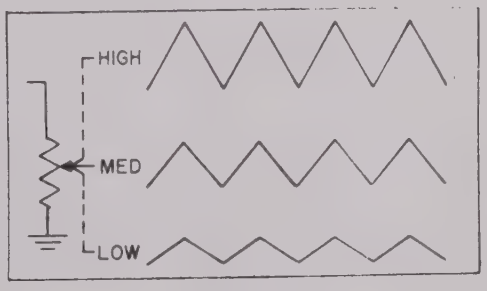


Figure 2.
How IDC Control Sets Steepness of Integrated Square Wave

In the incoming signal from the microphone wavefront steepness depends upon both amplitude and frequency. The over-all effect of the IDC circuitry is to place a barrier upon the maximum wavefront steepness which can pass into the modulator. The slope of high amplitude signals is controlled by clipping and integrating the square waves which they produce. The slope of high frequency signals is limited to the allowable maximum by reducing the amplitude of these signals (adjustment of the IDC control is described on the reverse side of the alignment procedure in this instruction section).

c. Modulator Stage to Power Output Stage

The crystal oscillator generates a specific frequency in 2.083 to 4.500 mc range. The exact frequency depends upon the assigned carrier frequency. The oscillator output is sent to the modulator stage where the voice modulation is impressed upon it. This signal is combined in the modulator to provide a modulated output at the crystal frequency. The modulator output is sent to the first doubler where the signals are amplified and doubled in frequency. They are further amplified and tripled in frequency in the tripler stage and doubled once more in the doubler-driver. The doubler-driver stage develops the required signal power to drive the final amplifier to its rated output r-f power. The signals reaching the final amplifier have been multiplied twelve times from the original frequency generated by the oscillator.

4. ADJUSTMENT OF THE "IDC" CONTROL

Correct setting of the IDC control is an important factor in the overall operation of the two-way radio communication system. Refer to the IDC adjustment information on the reverse side of the transmitter alignment procedure for complete information.

5. ALIGNMENT PROCEDURE

The transmitter is tuned and adjusted for its exact operating frequency prior to shipment from the factory. Unless damaged or abused in transit it should require no further adjustment before placing it in service, other than to align the final r-f amplifier stage to the antenna. If alignment is required, refer to the alignment procedure in this section.

Any 0-50 microampere meter with an equivalent series resistance of 20,000 ohms may be used as a metering device. The meter should be connected from chassis ground to the pin receptacle of the metering socket corresponding to the stage being measured. Refer to the schematic diagram for specific metering pin receptacle information.

AEPD-1279-G(EPD53)

PRE-ALIGNMENT NOTES

EXCERPTS FROM FCC REGULATIONS

1. Radio transmitters may be tuned or adjusted only by a person holding a 1st or 2nd class commercial radiotelephone operators license or by personnel working directly under their supervision.

2. The r-f power output of a station shall be no more than required for satisfactory technical operation considering the area to be covered and the local conditions.

TEST EQUIPMENT REQUIRED

1. Motorola Portable Test Set (S1056A-9A, P-8500 series, P-8501 series or TU546 series).
2. Motorola K-9322 Alignment Tool Kit, and an insulated dial screwdriver.
3. Motorola T1100A Series Frequency Monitor (for oscillator alignment and deviation adjustment).
4. RF wattmeter or dummy antenna.
5. Power Supply (preferably the one designed for the transmitter under test).

HOW TO SET UP THE P-8500 AND P-8501 SERIES TEST SETS

1. Connect the dummy antenna or r-f wattmeter to the transmitter ANT. jack.
2. Connect the test set cable plug to the transmitter METER jack.
3. Place the test set REC-XMTR-0-50 UA switch in the XMTR position.
4. Place the GRID CURRENT-METER-FIELD STRENGTH switch in the METER position.

HOW TO SET UP THE S1056A-9A OR TU546 SERIES TEST SET

1. Connect the dummy antenna or r-f wattmeter to the transmitter ANT. jack.
2. Connect one end of the metering cable to the test set and the other end to the transmitter METER receptacle. (When not using test set, disconnect the 20-pin meter cable to conserve internal battery life. This plug completes the battery circuit acting as an ON-OFF switch.
3. Place the Function Selector Switch in the XMTR position.
4. Place the oscillator and meter reversing switch in the OFF position.

PRELIMINARY ALIGNMENT PROCEDURE

1. Connect the power supply to the transmitter as shown on the intercabling diagram for the radio set.
2. Place the HI-LO switch on the power supply in the LO position.
3. Turn the equipment on. Allow 30 seconds for the tubes to warm up.

HOW TO KEY THE TRANSMITTER

1. Use the XMTR-ON switch of the test set to place the unmodulated carrier on the air for meter reading and adjustment.
2. Use the Motorola TU353A Microphone (or equivalent) to key the transmitter and modulate the carrier as required.

CAUTION

Do not key the transmitter for more than a few seconds at a time until it is properly tuned. Plate current is excessive in all stages and may damage the unit. Turn the transmitter on for brief periods while reading the meter and making the adjustments.

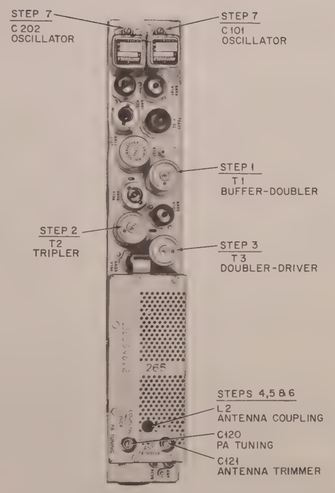
FREQUENCY CALCULATIONS

$f_o = \frac{f_c}{12}$ where: f_o = crystal frequency, and f_c = carrier frequency

"IDC" CONTROL SETTING

NOTE

See reverse side of this page for complete details.



ALIGNMENT PROCEDURE

STEP	SWITCH POS. S1056A-9A or TU546 TEST SET	ADJUSTMENT	METER READING	STAGE, CONDITIONS AND PROCEDURE
1	4	T1	Maximum	BUFFER-DOUBLER. Adjust primary slug from bottom. Adjust secondary slug from top. The circuit frequency is two times the crystal frequency.
2	5	T2	Maximum	TRIPLER. Adjust primary slug from bottom. Adjust secondary slug from top. The circuit frequency is six times the crystal frequency. Repeak T1 with the meter switch in position 4.
3	6	T3	Maximum	DOUBLER-DRIVER. Adjust primary slug from bottom. Adjust secondary slug from top. Tune for a definite peak. The meter will always show the fixed bias in this position. A definite peak reading indicates proper alignment. The circuit frequency is twelve times the crystal frequency.
4	7	C120, C121	Minimum (Dip)	POWER AMPLIFIER. Loosen locknuts on C120 and C121. Using the insulated dial screwdriver, set ANT. TRIMMER C121 for minimum plate current. Turn COUPLING adjustment (L2) fully counterclockwise (decoupled). Tune C120 for a dip. Set power supply HI-LO switch to HI.
5	7	C121	Maximum	ANTENNA INPUT. Using the insulated dial screwdriver adjust ANT. TRIMMER C121 for maximum meter reading.
6	7	C120, C121, L2	Maximum RF Output NOTE DO NOT EXCEED 150 ma (30 ua) 30 watt model 125 ma (25 ua) 50 watt model	ANTENNA COUPLING. Remove test load and connect antenna. 1. Using field strength meter: Make adjustments with transmitter shielded as much as possible by housing. Place r-f probe near antenna. Adjust C121 and COUPLING (L2) for maximum r-f indication on meter. Do not exceed 150 ma (30 ua) in the 30 watt model or 125 ma (25 ua) in the 50 watt model. 2. Without field strength meter: Turn COUPLING (L2) counterclockwise, increasing gradually while retuning C120 for dip. Increase coupling until only a slight dip is apparent. DO NOT overcouple. This causes the dip to disappear and reduces power output. Recheck setting of C121. DO NOT EXCEED 150 ma (30 ua) in the 30 watt model or 125 ma (25 ua) in the 50 watt model. Repeak T1, T2 and T3. Tighten locknuts on C120 and C121.
7		C101, C202	Maximum On-frequency	OSCILLATOR. Adjust only when primary or secondary frequency standard is available (Motorola T1100A Series may be used). Set up frequency monitor. Loosen locknut, adjust C101 for "on-frequency" reading on monitor. Tighten locknut. In 2-frequency sets adjust C202 same as C101.

FINAL METER READINGS

Each time a transmitter is aligned or tested, final meter readings should be made and entered in a logbook.

All readings given in the table below are minimum except PA, which is maximum. DO NOT exceed the value given for the PA current. This is the maximum plate current to which the unit can be safely tuned.

Readings 1 through 6 are purely relative and do not give actual current or voltage measurement.

When using the P-8500 or the P-8501 series test sets, position 7 is a d-c voltmeter with 1000 volts full scale. Actual B+ reading is obtained by multiplying the microampere scale reading by 40. The S1056A-9A or TU546 series test sets have a 0-1000 volt d-c scale from which the B+ is read directly.

When using the P-8500 or the P-8501 series test sets, position 8 indicates d-c relay control voltage when the transmitter is not keyed. Multiply the microampere scale reading by 0.3 to obtain the actual value of the d-c voltage. When using the S1056A-9A or TU546 series test sets, the relay control voltage is read directly with the position selector switch in position 10.

For all three series portable test sets, multiply the scale reading by 5 to obtain the actual PA plate current in milliamperes.

SWITCH POSITION	P-8500 & P-8501 SERIES	1	2	3	-4	5	6	7	8	PA(*4)
	S1056A-9A or TU546 SERIES	1	2	3	4	5	6	9	10	7
METER READING	30 WATTS	-	-	-	4	18	14	20	-	30
	50 WATTS	-	-	-	4	18	18	20	-	25
CIRCUIT METERED		-	-	-	Tripler Grid	Dblr. Driver Grid	PA Grid	PA Plate Voltage	Push-to-Talk	PA Plate Current

"IDC" ADJUSTMENT (PREFERRED METHOD USING OSCILLOSCOPE)

1. INTRODUCTION

Accuracy of test equipment is of prime importance to any user of radio communications equipment; but of equal importance is a knowledge of the characteristics of the measuring equipment under various conditions. The Motorola T1100A Series FM Station Monitor is the leader in the field with respect to sensitivity, accuracy under conditions of variation in r-f signal level, line voltage, and environmental conditions. In common with most other meters it has the characteristic of responding differently to different wave shapes. Therefore, the use of most present-day deviation meters can lead to confusion and errors in deviation setting, if the pitfalls are unknown or disregarded.

The ideal deviation indicator would be one which would respond instantaneously to the peak value of the modulation deviation regardless of waveform. The only device which meets all these requirements is an oscilloscope. It responds instantaneously and it shows the peak value of any waveform, no matter how complex. Properly calibrated, an oscilloscope is the most accurate and reliable instrument for measuring and setting transmitter deviation.

The oscilloscope must be used in conjunction with a receiver which has a stable discriminator characteristic, since the oscilloscope displays the demodulated signal. In addition to the oscilloscope and receiver, a means to accurately calibrate the system is required. The Motorola monitor fills these requirements, since it provides both a sensitive receiver with the proper discriminator characteristic and a reliable means of calibrating the oscilloscope. It has convenient terminals on the front panel for connection of the oscilloscope. Also, the Motorola frequency and deviation monitor has two modulation meter scales, 0-20 kc for wide-band system, and 0-10 kc for split-channel systems.

Split-channel conversion kits are available for modification of older models. When converted, the older models have convenient oscilloscope terminals and can be more accurate measurement devices for such systems.

2. TEST EQUIPMENT REQUIRED

a. Motorola T1100A Series FM Station Monitor (or equivalent)

b. Motorola Model TEK-1A Transistorized Tone Generator, 1000 cps (or equivalent)

c. Motorola Model T1015A Oscilloscope (or equivalent)

3. OSCILLOSCOPE CALIBRATION

The first step in the measurement of transmitter deviation is to calibrate the oscilloscope. This can be done by using the transmitter which is to be measured.

Proceed as follows:

a. Connect the oscilloscope to the monitor oscilloscope terminals and set up the monitor controls in accordance with the monitor instruction manual.

b. Turn the IDC control on the transmitter chassis to the full clockwise position.

c. Feed a 1000 cps test tone into the transmitter audio input (at mike receptacle). Modulate the transmitter with this tone so adjusted that the deviation as read on the FM monitor deviation meter is 2 kc (6 kc in a wide-band system). An audio oscillator must be used for generation of this tone, since a sinusoidal waveform is very important. The Motorola TEK-1A Transistorized Tone Generator is excellent for this purpose.

d. Adjust the vertical gain of the oscilloscope so that the total recovered audio pattern occupies some convenient height, e.g., four small squares. (12 squares in a wide-band system). The split-channel condition is shown in figure 1.

Figure 1.
Oscilloscope Calibration for
Split-Channel Transmitter

Having calibrated the oscilloscope, there is no further need for the modulation deviation meter. Ignore its readings from this point on. It has already performed its important function of calibrating the oscilloscope.

With the oscilloscope calibrated as indicated, a recovered signal which occupies 10 squares (peak-to-peak) is equivalent to ±5 kc deviation. For wide-band systems, a recovered signal occupying 30 squares (peak-to-peak) is equivalent to ±15 kc deviation.

4. MEASUREMENT AND SETTING OF TRANSMITTER DEVIATION

Once the oscilloscope has been calibrated the transmitter deviation can be properly adjusted by the following method.

a. Adjust the 1000 cps input signal to 1 volt. This should drive the IDC circuit to the full clip. See figure 2.

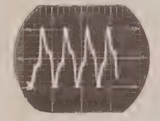


Figure 2.
5 KC Peak Deviation as seen on the Oscilloscope
(NOTE: Waveform is clipped fully)

b. With this input signal level, adjust the IDC control on the transmitter to provide a 10-square peak-to-peak recovered signal on the oscilloscope. This is equivalent to ±5 kc deviation as shown in figure 2. A wide-band system should be adjusted for 30 squares (±15 kc).

c. Reduce 1000 cps input to 0.25 volt. Essentially full deviation should still be observed on the oscilloscope. Less than 3/4 full deviation may indicate a weak audio tube or other lack of audio gain.

5. EMERGENCY MEASUREMENT OF DEVIATION

If an audio oscillator is not available, a loud sustained whistle of approximately 1000 cycles can be used for a rough measurement of deviation. If this rough check indicates the need for resetting deviation, do so only under controlled conditions, using a 1000 cps tone as previously indicated. The calibration of the oscilloscope should always be performed with a steady controlled signal. Do not attempt to calibrate the oscilloscope with a sustained whistle as waveform distortion will prevent an accurate calibration.

6. OTHER MEANS FOR MEASUREMENT OF DEVIATION

Another accurate means of measuring transmitter deviation is to use the Motorola T1020A Portable Frequency and Deviation Meter. This unit, properly used, permits the accurate measurement and setting of transmitter deviation from peak-reading meter, which is unaffected by waveform. An oscilloscope is not required with this instrument. With this device, the transmitter deviation can be measured accurately even with voice modulation.

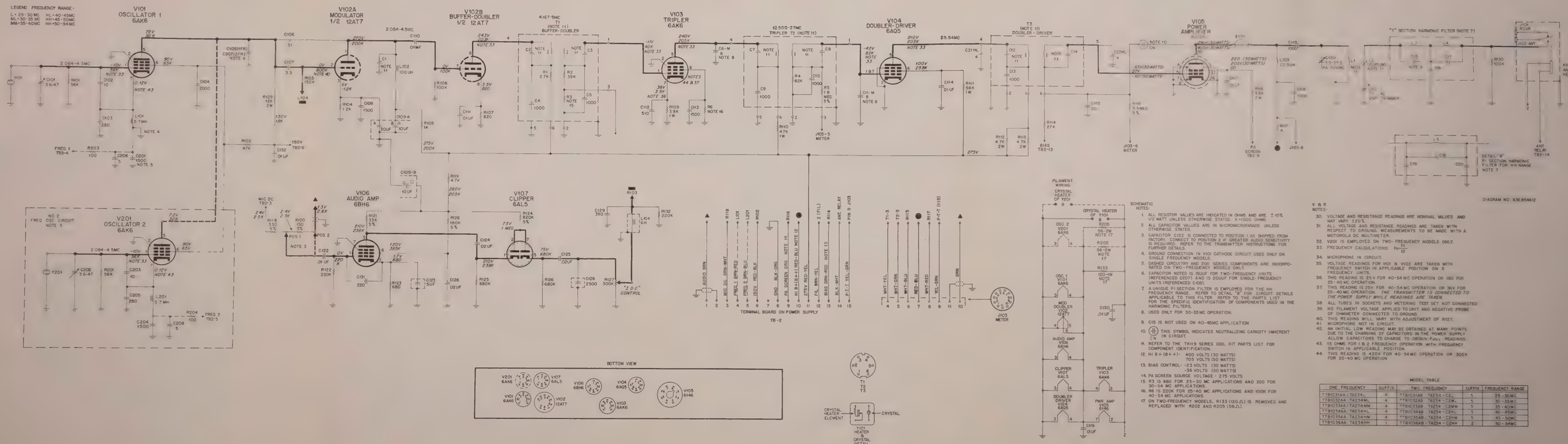
7. MICROPHONE LEVELS

If the modulation level in the system still appears to be too low after setting deviation as indicated above, check the microphone.

The foregoing procedure will insure that the transmitter will comply with FCC requirements for maximum deviation.

The importance of the correct deviation setting can not be overemphasized. Optimum system performance demands accurate deviation setting, both from the standpoint that overdeviation will interfere with the user on the adjacent channel, and underdeviation may reduce system range.

AEPD-4554-O(p/o CE1840)
AEPD-4555-O(p/o CE1840)


LEGEND FREQUENCY RANGE -
L - 25-30 MC
ML-30-35 MC
MM-35-40MC
HL-40-45MC
HM-45-50MC
HH-50-54 MC
V101 OSCILLATOR 1 6AK6
V102A MODULATOR 1/2 12AT7
V102B BUFFER-DOUBLER 1/2 12AT7
V103 TRIPLER 6AK5
V104 DOUBLER-DRIVER 6AQ5
V105 POWER AMPLIFIER
V106 AUDIO AMP 6BH6
V107 CLIPPER 6AL5
V201 OSCILLATOR 2 6AK6
NO 2 FREQ OSC CIRCUIT NOTE 5
4.167-5MC T1 (NOTE 11) BUFFER-DOUBLER
42.500-27MC TRIPLER T2 (NOTE 11)
T3 (NOTE 11) DOUBLER - DRIVER
25.54MC
"PI" SECTION HARMONIC FILTER (NOTE 7)
DETAIL "B" PI SECTION HARMONIC FILTER FOR HH RANGE NOTE 7
KIOH ANTENNA RELAY
ANT. RELAY TB2-14
PA SCREEN TB2-9
BIAS TB2-13
J103-5 METER
J103-6 METER
J103 METER
"1.0 C" CONTROL
TERMINAL BOARD ON POWER SUPPLY
TB-2
BOTTOM VIEW
V201 6AK6
V107 6AL5
V106 6BH6
V104 6AQ5
V105 6146
V101 6AK6
V102 12AT7
V103 6AK5
T1
T2
T3
CRYSTAL HEATER ELEMENT
CRYSTAL
Y101 HEATER & CRYSTAL DETAIL
FILAMENT WIRING
CRYSTAL HEATER OF Y101
OSC 2 V201 6AK6
OSC 1 V101 6AK6
MOD DOUBLER V102 12AT7
AUDIO AMP V106 6BH6
CLIPPER V107 6AL5
DOUBLER DRIVER V104 6AQ5
TRIPLER V103 6AK6
PWR AMP V105 6146
SCHEMATIC NOTES:
1. ALL RESISTOR VALUES ARE INDICATED IN OHMS AND ARE ± 10% 1/2 WATT UNLESS OTHERWISE STATED. K=1000 OHMS
2. ALL CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS OTHERWISE STATED.
3. CAPACITOR C122 IS CONNECTED TO POSITION 1 AS SHIPPED FROM FACTORY. CONNECT TO POSITION 2 IF GREATER AUDIO SENSITIVITY IS REQUIRED. REFER TO THE TRANSMITTER INSTRUCTIONS FOR FURTHER DETAILS.
4. GROUND CONNECTION IN V101 CATHODE CIRCUIT USED ONLY ON SINGLE FREQUENCY MODELS.
5. GASKED CIRCUITRY AND 200 SERIES COMPONENTS ARE INCORPORATED ON TWO-FREQUENCY MODELS ONLY.
6. CAPACITOR NOTED IS ISSUIP FOR TWO-FREQUENCY UNITS (REFERENCED C207) AND IS 200UUF FOR SINGLE-FREQUENCY UNITS (REFERENCED C105).
7. A UNIQUE PI SECTION FILTER IS EMPLOYED FOR THE HH FREQUENCY RANGE. REFER TO DETAIL "B" FOR CIRCUIT DETAILS APPLICABLE TO THIS FILTER. REFER TO THE PARTS LIST FOR THE SPECIFIC IDENTIFICATION OF COMPONENTS USED IN THE HARMONIC FILTERS.
8. USED ONLY FOR 30-35 MC OPERATION.
9. C15 IS NOT USED ON 40-45MC APPLICATION
10. ⏚ THIS SYMBOL INDICATES NEUTRALIZING CAPACITY INHERENT IN CIRCUIT.
11. REFER TO THE TK1H9 SERIES COIL KIT PARTS LIST FOR COMPONENT IDENTIFICATION.
12. HI B+(B+4-3) - 400 VOLTS (50 WATTS)
705 VOLTS (50 WATTS)
13. BIAS CONTROL: -23 VOLTS (30 WATTS)
-36 VOLTS (50 WATTS)
14. PA SCREEN SOURCE VOLTAGE - 275 VOLTS
15. R3 IS 680 FOR 25-30 MC APPLICATIONS AND 200 FOR 30-54 MC APPLICATIONS.
16. R6 IS 220K FOR 25-40 MC APPLICATIONS AND 100K FOR 40-54 MC APPLICATIONS
17. ON TWO-FREQUENCY MODELS, R133 (120Ω,1) IS REMOVED AND REPLACED WITH R202 AND R205 (56Ω,1)
V & R NOTES:
30. VOLTAGE AND RESISTANCE READINGS ARE NOMINAL VALUES AND MAY VARY ±20%.
31. ALL VOLTAGE AND RESISTANCE READINGS ARE TAKEN WITH RESPECT TO GROUND. MEASUREMENTS TO BE MADE WITH A MOTOROLA DC MULTIMETER.
32. V201 IS EMPLOYED ON TWO-FREQUENCY MODELS ONLY.
33. FREQUENCY CALCULATIONS: Fo=Fc/12
34. MICROPHONE IN CIRCUIT.
35. VOLTAGE READINGS FOR V101 & V102 ARE TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION ON 8 FREQUENCY UNITS.
36. THIS READING IS 25V FOR 40-54 MC OPERATION OR 160 FOR 25-40 MC OPERATION
37. THIS READING IS 25V FOR 40-54 MC OPERATION OR 36V FOR 25-40 MC OPERATION. THE TRANSMITTER IS CONNECTED TO THE POWER SUPPLY WHILE READINGS ARE TAKEN.
38. ALL TUBES IN SOCKETS AND METERING TEST SET NOT CONNECTED
39. NO FILAMENT VOLTAGE APPLIED TO UNIT AND NEGATIVE PROBE OF OHMMETER CONNECTED TO GROUND.
40. THIS READING WILL VARY WITH ADJUSTMENT OF R127.
41. MICROPHONE NOT IN CIRCUIT.
42. AN INITIAL LOW READING MAY BE OBTAINED AT MANY POINTS DUE TO THE CHARGING OF CAPACITORS IN THE POWER SUPPLY. ALLOW CAPACITORS TO CHARGE TO OBTAIN FULL READINGS.
43. 15 OHMS FOR 1 & 2 FREQUENCY OPERATION WITH FREQUENCY SWITCH IN APPLICABLE POSITION
44. THIS READING IS 420K FOR 40-54 MC OPERATION OR 300K FOR 25-40 MC OPERATION
MODEL TABLE
ONE FREQUENCY | SUFFIX | TWO FREQUENCY | SUFFIX | FREQUENCY RANGE
TTBIO34AA / TA234AL | 4 | TTBIO34AB - TA234 - C2L | 5 | 25 - 30 MC
TTBIO32AA - TA234ML | 4 | TTBIO32AB - TA234 - C2M | 5 | 30 - 35 MC
TTBIO33AA - TA234MM | 4 | TTBIO33AB - TA234 - C2MM | 5 | 35 - 40 MC
TTBIO34AA - TA234HL | 4 | TTBIO34AB - TA234 - C2HL | 5 | 40 - 45 MC
TTBIO35AA - TA234HM | 4 | TTBIO35AB - TA234 - C2HM | 5 | 45 - 50 MC
TTBIO36AA - TA234HH | 1 | TTBIO36AB - TA234 - C2HH | 2 | 50 - 54 MC
DIAGRAM NO. 63E854612

PREVIOUS REVISIONS LISTED ON BACK OF THIS DIAGRAM

Models TTB1030AA/TA234 and TTB1030AB/TA234-C2 Transmitter
Schematic Diagram
Motorola No. 63E854612-H
4/3/64-RS

REVISIONS

DIAG ISSUE	CHASSIS AND SUFFIX NO	REF. SYMBOL	CHANGE	LOCATION
E	[illegible]	C [illegible]	[illegible]	PARTS LIST
	[illegible]		[illegible]	NOTE 31
E2	[illegible]	C [illegible]	WAS 33K [illegible]	PARTS LIST
E3	[illegible]		[illegible]	NOTE
E4	[illegible]		[illegible]	NOTE
F	[illegible]		[illegible]	V107 PLATE
J	[illegible]	V105	WAS [illegible]	
Q	[illegible]	R [illegible]	[illegible]	[illegible]
	[illegible]	R133	RELOCATED	[illegible]
U	[illegible]	[illegible]	[illegible]	[illegible]

PARTS LIST for Schematic Diagram 68K864d12-H

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITORS, fixed: mica unless otherwise stated
C11, ML	21K81 [illegible]	ceramic; rectangular; 50 uuf ±5%
[illegible] MM	21K2 [illegible]	molded silver mica; 5 uuf ±5%
C1HL	21K [illegible]	Dipped silver mica; 20 uuf ±5%
C2MM, 4L	21 [illegible]	ceramic; tubular; 1 uuf ±5%,
C2L, 4L	21K [illegible]	ceramic; tubular; 50 uuf ±5%,
C2MM, MM, 4MM, HL, HM	21K [illegible]	ceramic; tubular; 15 uuf
C2HL, HM, HH	21K [illegible]	ceramic; tubular; 6 uuf ±1 uuf
C3L, 4L, 5L, 6L	21K [illegible]	[illegible]; mica; [illegible] uuf ±2 %,
C3ML, 4L, MM, ML	21R892897	ceramic; tubular; 8 uuf ±.5 uuf
C3HL, HM, HH	21K2753	molded silver mica; 3.3 uuf ±.5 uuf 500 v
C3L, 4HH	21R891167	ceramic; tubular; 12 uuf ±5%; 500 v
C4HL, HM, 21HL, 22HL	21K474952	ceramic; tubular; 4 uuf ±.5 uuf 500 v
C15ML, MM	21A478274	molded; tubular; 2.2 uuf ±20% 500 v
C16L, HM	21K410062	molded silver mica; 170 uuf ±5%, 500 v
C16ML	21R6506	molded silver mica; 150 uuf ±5%; 500 v
C16MM	21K410061	molded silver mica; 130 uuf ±5%; 500 v
C16HL	21K410060	molded silver mica; 110 uuf ±5%, 500 v
C17L, MM	21R38932	ceramic; tubular; 24 uuf ±5%; 500 v
C17ML, HL, HM	21R474330	ceramic; tubular; 20 uuf ±5%; 500 v
C18HH, 20HH	21K801488	molded silver mica; 40 uuf ±1%, 500 v
C101, 202	19A475604	variable; air; 3.6 uuf min. 47 uuf max.
C102, 203	21R410063	ceramic, tubular, 10 uuf ±10%, 500 v
C103, 205	21K859943	dipped silver mica; 250 uuf ±5%, 500 v
C104	21K817746	ceramic; disc, 2000 uuf ±10%; 500 v
C105, 115	21K2768	molded silver mica; 20 uuf ±10%, 500 v; used only in 1-freq. model; replace with C207 in 2-freq. model
C106	21R81198	ceramic; tubular; 51 uuf ±5%, 500 v
C108, 113, 204	21B800801	ceramic, disc, .0015 uf GMV +100% max, 500 v
C109	23K892117	electrolytic, tubular, 3 sec; consisting of:
C109A		20 uf +100-10%, 25 v; sec
C109B		△10 uf +50-10%; 450 v; sec
C109C		□10 uf +50-10%; 450 v, sec
C110, 111, 114, 116, 117, 122, 130, 132	21A801139	ceramic, disc, .01 uf +80-20% 500 v
C112	21K845214	dipped silver mica, 510 uuf ±5%, 300 v
C118, 119	21K2727	molded mica; 1000 uuf ±20%, 2000 v
C120	19B830246	variable; air, 5.5 uuf min. -33.5 uuf max.
C121	19A830291	variable; air; 7.1 uuf min. -140 uuf max.
C123	23C820770v2	electrolytic, tubular; 1 sec; 5 uf +100-15%; 150 v
C124, 125, 128	21B401029	ceramic, disc, .02 uf +80-20%, 600 v
C126	8K836753	oil filled; tubular, .0025 uf ±10%, 100 v

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
C129	21K0720	molded silver mica; 390 uuf ±5%; 500 v
C131	21R410115	ceramic; disc; 220 uuf ±20%; 500 v
C206, 208	23K857384	electrolytic; tubular; 5 uf +100-10%; 50 v
C207	21R41867	ceramic; tubular; 15 uuf ±5%; 500 v; replaces C105 (20 uuf) in ONE-Freq. Operation
		SUPPRESSOR
E101	6A832263	parasitic
		CONNECTORS, receptacle:
J101	9A87120	female; single contact; round molded mica filled phenolic base; chassis mounted: RECEIVER
J102		same as J101 except connects to ANTENNA
J103	9A880881	female; 11 contact; polarized; round molded black phenolic base; saddle mounting; METER
		RELAY, Armature:
K101	59K854405	non-coaxial; contact arrangement; 1 form "C"
		COIL, RF:
L1L	24K832226	tank; 7-1/2 turns
L1ML, MM	24K832077	tank; 5-1/2 turns
		COIL, RF:
L1HL, HM, HH	24A832225	tank; 3-1/2 turns
L2L	24K832476	output coupling; 4-1/2 turns
L2ML, MM	24K832249	output coupling; 3-1/2 turns
L2HL, HM	24A830195	output coupling; 2-1/2 turns
L2HH	24A832875	output coupling; 3-1/2 turns
L3L, 4L	24K810403	harmonic filter; 8 turns
L3ML, 4ML, 5ML, 6ML	24K810402	harmonic filter; 7 turns
L3MM, 4MM	24K810401	harmonic filter; 6 turns
L3HL, 4HL	24B810400	harmonic filter; 5 turns
L4HM, 5HM	24K832224	harmonic filter; 4 turns
L101, 201	24K864763	choke; 5.7 millihenries
L102	24A832402	choke, 100 microhenries
L103	24A812542	choke, 22.5 microhenries
L104	25D850636	AF: choke; 6 henries
		RESISTOR, fixed: carbon; unless otherwise stated
R1	6R5577	2.7K ±10%; 1/2 w; ins.
R2	6R6487	37K ±10%; 1/2 w; ins.
R3, 4	6R5651	680 ohm ±5%; 1/2 w; ins.
R4ML, MM	6R6166	1.2K ±5%; 1/2 w; ins.
R5HL, HM, HH		
R6	6R5644	82K ±10%, 1/2 w; ins.
R7	6R401017	1.8 megohm ±5%; 1/2 w; ins.
R8L, ML, MM, 2L, 4L	6R6407	220K ±10%; 1/2 w; ins.
R6HL, HM, HH, 106, 130, 131	6R6031	100K ±10%; 1/2 w; ins.
R101, 201	6R6378	56K ±10%; 1/2 w; ins.
R102	6R6048	47K ±10%, 1/2 w; ins.
R103	6R6398	150K ±10%; 1/2 w; ins.
R104	6R6393	1.2K ±10%; 1/2 w; ins.
R105	6R6229	1K ±10%; 1/2 w; ins.
R107	6R6269	820 ohm ±10%; 1/2 w; ins.
R108	6R5618	3.9K ±10%; 1 w; ins.
R110	6R5576	4.7K ±10%; 1 w; ins.
R111	6R6402	56K ±10%; 1 w; ins.
R112, 113	6R5671	4.7K ±10%; 2 w; ins.
R114	6R6434	27K ±10%; 1/2 w; ins.
R115	6R488185	3.3 megohm ±5%; 1/2 w; ins.
R116	6R5765	5.6K ±10%, 2 w; ins.
R117	17K892469	wire wound; 4 ohm ±2%; 1 w; ins.
	or 17B821901	wire wound; 4 ohm ±2%; 3 w; ins.
R118	6R120618	330 ohm ±5%; 1/2 w; ins.
R119	6R6080	4.7K ±10%; 1/2 w; ins.
R120	6R5645	150 ohm ±5%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
R121	6R2068	33K ±5%; 1/2 w; ins.
R123	6R6040	680 ohm ±10%; 1/2 w; ins.
R124	6R5773	820K ±5%; 1/2 w; ins.
R125, 126	6R6475	680K ±10%; 1/2 w; ins.
R127	18K812998	variable; 300K ±20%; 1/4 w;
R128	6R2061	180K ±5%; 1/2 w; ins.
R129	6R5766	12K ±10%; 2 w; ins.
R133	6R488021	120 ohm ±10%; 1 w; ins.
R202,204,205	6R488090	56 ohm ±10%; 2 w; ins.
R203	6R6326	100 ohm ±10%; 1/2 w; ins.
		TRANSFORMER, RF:
T1L	24K832479	Buffer-Doubler; base stamped 479; includes two 46K821425 CORE, adjustable tuning and C2L, C3L, C4, C5, R1, R2, R3L
T1ML	24B832071	Buffer-Doubler; base stamped 071; includes two 46K821425 CORE, adjustable tuning and C2ML, C3ML, C4, C5, R1, R2, R3ML
T1MM		same as T1ML except includes C2MM, C3MM, C4, C5, R1, R2, R3MM
T1HL	24B832211	Buffer-Doubler; base stamped 211; includes two 46K821425 CORE, adjustable tuning and C2HL, C3HL, C4, C5
T1HM		same as T1HL except includes C2HM, C3HM, C4, C5, R1, R2, R3HM
T1HH	24K832458	Buffer-Doubler; base stamped 458; includes two 46K821425 CORE, adjustable tuning and C4, C5, R1, R2, R3HH
T2L	24K832478	Tripler, base stamped 478; includes two 46K821425 CORE, adjustable tuning and C7L, C8L, C9, C10, R4, R5
T2ML, MM	24B832073	Tripler; base stamped 073; includes two 46K821425 CORE, adjustable tuning and C9, C10, R4, R5
T2HL	24B832212	Tripler; base stamped 212; includes two 46K821425 CORE, adjustable tuning and C7HL, C8HL, C9, C10, R4, R5
T2HM		same as T2HL except includes C7HM, C8HM, C9, C10, R4, R5
T2HH	24K832459	Tripler; base stamped 459; includes two 46K821425 CORE, adjustable tuning and C9, C10, R4, R5
T3L	24K832477	Doubler-Driver; base stamped 477; includes two 46K821425 CORE, adjustable tuning and C12L, C13, C14L
T3ML, MM	24B832072	Doubler-Driver; base stamped 072; includes two 46K821425 CORE, adjustable tuning and C13
T3HL, HM, HH	24B832213	Doubler-Driver; base stamped 213; includes two 46K821425 CORE, adjustable tuning and C13
		TUBE,
V101, 103, 201	6AK6	Electron
V102	12AT7	Electron
V104	6AQ5	Electron
V105	197R130A01	Electron type 8298
V106	6BH6	Electron
V107	6AL5	Electron
		SOCKET, tube; female:
XV101, 103, 104, 201	9K87124	7 contact; miniature molded mica filled phenolic base; includes center shield; saddle mounting

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
XV102	9K825586	9 contact; miniature; molded mica filled phenolic base; includes center shield and tube shield base; saddle mounting
XV105	9B890001	8 contact; brown bakelite wafer base; saddle mounting
XV106, 107	9B834083	7 contact; miniature molded mica filled phenolic base; includes center shield and tube shield base; saddle mounting
		SOCKET, crystal: female:
XY101, 201	9A30451	4 contact; square molded mica filled bakelite base; chassis mounted

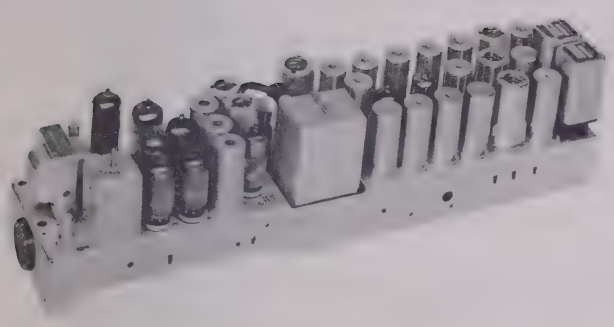
CRYSTALS

NOTE

Crystal Units are part of the Radio Set model. When ordering a transmitter chassis only, crystals must be ordered separately. Crystal type number and operating frequency must be specified when ordering crystal.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CRYSTAL UNIT
Y101, 201	Type RN3-A	Quartz: Transmitter Oscillator; 2.08333 - 4.50000 MC; with 6 v heater unit

RECEIVER



TRB1080AC/TA235W-R2 RECEIVER

MODEL CHART

MODEL NUMBER	NUMBER OF FREQUENCIES	CHANNEL SPACING
TRB1080AA/ TA235W	1	40 KC
TRB1080AC/ TA235W-R2	2	40 KC
TRB1080AB/ TA235S	1	20 KC
TRB1080AD/ TA235S-R2	2	20 KC
TA235X	1	120 KC
TA235X-R2	2	120 KC

1. DESCRIPTION

a. Application

The receivers listed in the MODEL CHART receive FM signals on one (or two) fixed, crystal-controlled frequencies in the 25-54 mc band. The receivers obtain operating voltages from the power supply which is part of the overall radio set.

b. Design

The receiver incorporates a double-conversion superheterodyne circuit. The chassis has 15 tubes and 17 tuned circuits, excluding the plastic-sealed circuits of the "Permakay" i-f filter. The i-f wave filter is the major factor in determining the signal reception bandwidth. On models designed for 20 kc channel spacing operation the signals are attenuated -100 db at ±15 kc. On 40 kc models the signals are attenuated -100 db at ±32 kc. On 120 kc models the attenuation is -100 db at ±120 kc.

c. Basic Receiver Circuitry

The basic receiver circuit consists of the following stages: an r-f amplifier, a first local oscillator, a first mixer, a first i-f amplifier, a second local oscillator, a second mixer, three second i-f amplifiers, two limiters, a discriminator and two stages of audio amplification.

d. Two-Frequency Models

The two-frequency receiver is the same as the single-frequency receiver except for the addition of another first oscillator and control crystal. Two-frequency models receive signals on two specific, crystal-controlled frequencies in the band. Only one frequency can be received at a time. The two-frequency receivers are designed for operation with a frequency separation between channels as great as 120 kc without any

GUARANTEED PERFORMANCE SPECIFICATIONS

MODEL NUMBER	TRB1080AB/TA235S, TRB1080AD/TA235S-R2	TRB1080AA/TA235W, TRB1080AC/TA235W-R2	TA235X, TA235X-R2
CHANNEL SPACING	20 kc	40 kc	120 kc
SELECTIVITY	-100 db at ±15 kc	-100 db at ±32 kc	-100 db at ±120 kc
MODULATION ACCEPTANCE	±5 kc	±15 kc	±15 kc
TUNED CIRCUITS	29 including 12 plastic-sealed in "Permakay" filter	29 including 12 plastic-sealed in "Permakay" filter	20 including 3 plastic-sealed in "Tri-K" filter
SENSITIVITY	Less than 0.30 microvolt for 20 db quieting; 50 ohms r-f input impedance		
FREQUENCY STABILITY AND TEMPERATURE RANGE	Oven type crystal maintains oscillator stability within ±0.0005% from -30°C to +60°C ambient (+25°C reference)		
SPURIOUS AND IMAGE REJECTION	More than 100 db		
SQUELCH	Noise compensated type, adjustable sensitivity, threshold sensitivity of 0.10 microvolt		
TUBE COMPLEMENT AND FUNCTION	6EV5 - r-f amp *6CB6 - oscillator 6AB4 - 1st mixer 6BH6 - 1st i-f amp 6679/12AT7 - 2nd osc.-mixer *two for 2-frequency models	6CB6 - 2nd i-f amp (1) 6CB6 - 2nd i-f amp (2) 6CB6 - 2nd i-f amp (3) 6BH6 - 1st limiter 6BJ6 - 2nd limiter	6AL5 - discriminator 6BH6 - noise amp 6C4 - noise rect. 6679/12AT7 - audio and squelch amp 6AQ5 - audio output
AUDIO OUTPUT	2 watts to a 3 ohm speaker at less than 10% distortion		
AUDIO RESPONSE	From +1 db to -8 db of 6 db/octave de-emphasis characteristic from 300-3000 cps		

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

change in performance specifications. An external switch is used to select frequencies. The switch is connected into the cathode circuits of the two first local oscillator stages. In the F1 position the switch grounds the cathode of the #1 oscillator, permitting that stage to operate normally. At the same time it opens the cathode of the #2 oscillator to disable the #2 stage. In the F2 position the switch reverses the connections and selects the #2 local oscillator. The F1-F2 switch is part of the control head in mobile radio sets.

e. Chassis Complement

Each receiver consists of a basic chassis and a number of other items depending upon the frequency range, number of operating frequencies and channel spacing operation. The receivers are factory assembled from the sub-assemblies to form a compact single unit. The items included in each receiver are summarized in the following chart.

MODEL NUMBER	FREQ.		BASIC CHASSIS				*COIL KIT		FILTER			**CRYSTAL(S) REQUIRED	
	1-FREQ.	2-FREQ.	TU553	TU553-R2	TU553S	TU553S-R2	TK117C	TK117C-R2	TU540W	TU540S	TU540X	G04 (IF)	RM/RP-14A or RM/RP-15A (CONTROL)
TRB1080AA/ TA235W	X		X				X		X			1	1
TRB1080AC/ TA235W-R2		X		X				X	X			1	2
TRB1080AB/ TA235S	X				X		X			X		1	1
TRB1080AD/ TA235S-R2		X				X		X		X		1	2
TA235X	X		X				X				X	1	1
TA235X-R2		X		X				X			X	1	2

X = 1 used

2 = 2 used

* Coil kit designations include an L, M, H or HH suffix to indicate frequency range:

L = 25-30 mc, M = 30-40 mc, H = 40-50 mc, HH = 50-54 mc

** The crystal used with the radio set depends upon the operating frequency:

RM/RP-14A is for 25-40 mc

RM/RP-15A is for 40-54 mc

2. OPERATION

a. Stage Analysis

This receiver operates in accordance with basic FM receiver operation theory. The stage analysis given in these instructions is but a brief summary of the salient points. To follow the discussion refer to the block diagram included in this section of the manual. This diagram shows stage-by-stage signal flow and operating frequencies.

b. RF Amplifier

The carrier signals received at the antenna are coupled to the grid of the r-f amplifier by the impedance-matching network in the input circuit. The r-f stage provides some amplification of the signals, however, its main purpose in the circuit is to improve sensitivity and selectivity. The gain of this stage is designed to provide the optimum signal-to-noise ratio in the signals sent to the first mixer. In the output of this stage three hi-Q, critically coupled tuned circuits provide very high selectivity in the signals which pass on to the mixer.

c. First Oscillator and Mixer

The first oscillator generates a signal of the correct frequency for direct injection into the mixer without multiplication. This frequency is heterodyned with the incoming r-f carrier in the first mixer stage. The difference between these two frequencies is used as the mixer output. This output is a 5.5 mc signal which carries the modulation originally impressed on the incoming r-f carrier.

The local oscillator frequency is above the r-f carrier in sets tuned to the 25-40 mc range. The local oscillator is below the r-f carrier when the receiver operates in the 40-54 mc range. These frequency relationships can be expressed as follows:

For the 25-40 mc range:

$$f_o - f_c = 5.5 \text{ mc}$$

first oscillator frequency — r-f carrier frequency — first mixer output (first i-f)

For the 40-54 mc range:

$$f_c - f_o = 5.5 \text{ mc}$$

r-f carrier frequency — first oscillator frequency — first mixer output (first i-f)

In these formulas the carrier frequency is the frequency assigned to the transmitter which this receiver is intended to receive. The first oscillator operates at a specific frequency in the 30.5 to 48.5 mc range, depending upon the r-f carrier frequency. When the assigned carrier frequency is known, the oscillator frequency can be calculated as follows:

For the 25-40 mc range:

$$f_o = f_c + 5.5 \text{ mc}$$

For the 40-54 mc range:

$$f_o = f_c - 5.5 \text{ mc}$$

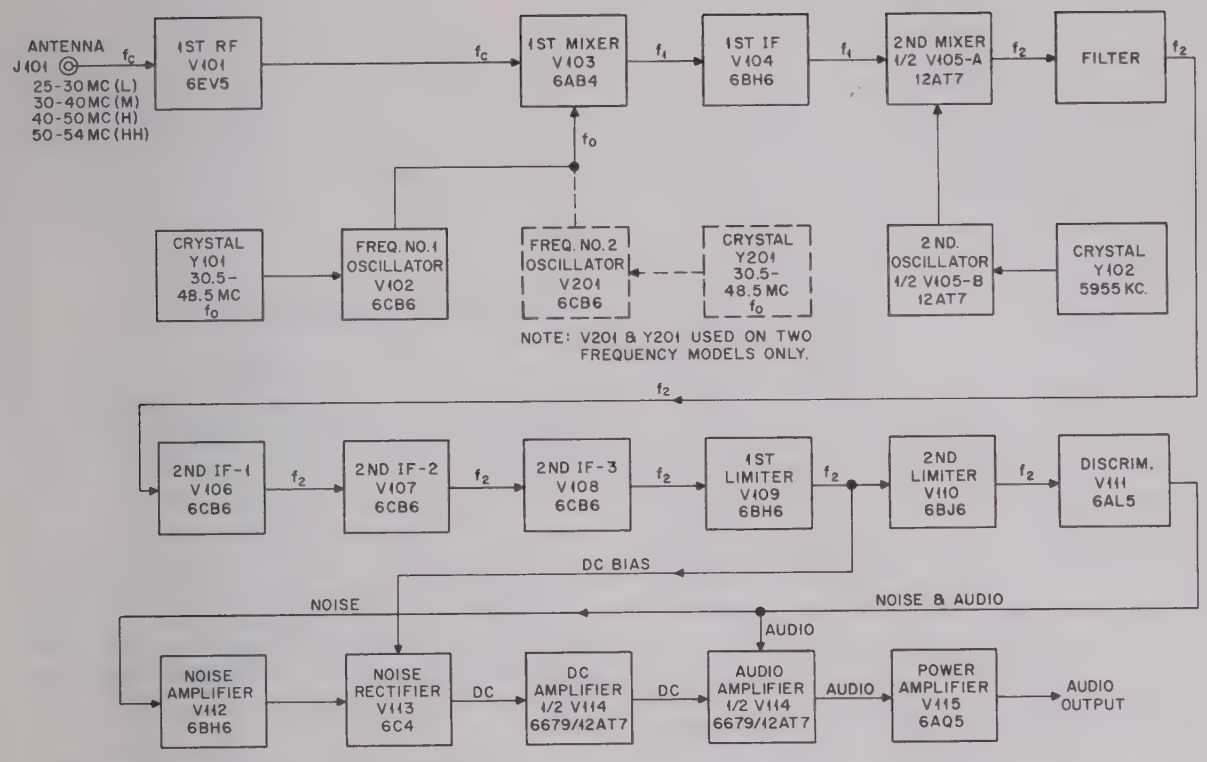
The first oscillator frequency is crystal-controlled to maintain oscillator stability within ±0.0005% from -30°C to +60°C ambient (25°C reference). The crystal element is mounted in a thermostatically-controlled heating oven to maintain proper operating temperature.

The first oscillator frequency is mixed with the carrier to provide the first i-f, 5.5 mc, which is passed on to the first i-f amplifier stage.

d. First IF and Second Mixer

The signals are amplified in the first i-f amplifier and applied to the second mixer along with an injection frequency generated in the second local oscillator. The second local oscillator frequency is controlled by the i-f crystal. This frequency is 5955 kc, the same for all receivers regardless of r-f carrier frequency. The difference between the second local oscillator frequency and the first i-f is the second mixer output. This output is a 455 kc signal which carries the audio modulation. The frequency relationships of these three stages are as follows:

Second local oscillator freq.	5955 kc
First intermediate freq.	5500 kc
Difference freq. (second i-f)	455 kc



63C854651-B

LEGEND:

f_c = CARRIER FREQUENCY (SEE TABLE).

f_o = 1ST OSCILLATOR FREQUENCY (SEE TABLE).

f_1 = 1ST INTERMEDIATE FREQUENCY = 5.5 MC.

f_2 = 2ND INTERMEDIATE FREQUENCY = 455 KC.

DIAGRAM NO. 63C854651

FORMULAS

BAND	f_o	f_c
L M	$f_c + f_1$	$f_o - f_1$
H HH	$f_c - f_1$	$f_o + f_1$

e. Second IF

A "Permakay" i-f filter is used in the second i-f before the amplification stages. This filter is permanently sealed in polyester-styrene and is unconditionally guaranteed for the life of the receiver provided the seal is unbroken and the housing is not tampered with. This filter is the major factor in determining the bandwidth of the receiver. It greatly attenuates the signal outside the pre-determined pass-band. Signals leaving the filter are amplified by three stages of second i-f amplification (tubes V106, V107 and V108) and applied to the limiter stages.

f. Limiters Discriminator and Audio Stages

The two limiter stages, tubes V109 and V110, clip the tops and bottoms of the incoming signals, thereby virtually eliminating the noise which characteristically "rides" the signals in the form of amplitude modulation. These stages are largely responsible for the "quieting" effect inherent in the FM communications receiver when it picks up an on-frequency signal. The limiter output is sent to the discriminator, tube V111, which translates frequency deviations into corresponding amplitude variations, thereby detecting the audio modulation. The audio amplification stage provides two watts audio output to a three ohm load.

g. Noise-Actuated Squelch Circuit

The noise-actuated squelch circuit consists of a noise amplifier, a noise rectifier, a d-c amplifier and associated circuit components, as shown on the schematic diagram. The discriminator output is applied to the input of the noise

amplifier, V112. The input r-c network greatly attenuates the low-frequency components but passes frequencies above 3000 cps. These random frequencies are applied as a signal to the grid of V112 and amplified like other types of signal inputs. In the cathode of the noise amplifier the variable SQUELCH control varies the gain of the tube by adjusting its bias. The setting of this control is covered in the following paragraph.

The output of the noise amplifier drives the noise rectifier, V113. The rectified noise signal appears as positive voltage across the load resistor, R152. This positive voltage is added to a steady negative bias taken from the second limiter stage. The resultant of these two voltages is applied to the grid of the d-c amplifier tube. In the no-signal condition, i.e., noise alone, the resultant voltage is zero or somewhat positive. The d-c amplifier conducts and cuts off the audio amplifier tube. This keeps the speaker silent when signals are not being received. When signals are received the noise is greatly reduced and the rectified noise output is not enough to overcome the steady negative bias on the grid of the d-c amplifier. In this condition, the d-c amplifier is cut off and the audio amplifier operates, passing on the received audio signals.

h. Squelch Control Setting

The SQUELCH control limits the gain of the noise amplifier tube. In practice, this control is adjusted for a "threshold" setting. This is the point where the rectified noise voltage will bias the grid of the d-c amplifier so that the audio amplifier is just barely cut-off. Then, when a weak signal is received a slight reduction in noise will cut off the d-c amplifier and allow the audio amplifier to conduct.

3. OPERATING ADJUSTMENTS

a. Audio Level Adjustments

The audio level control on the receiver chassis is used to set the maximum audio level available at the VOLUME control on the control unit. This permits future adjustments to compensate for variations in tube characteristics, resistor and capacitor tolerances and transmitter deviation. This control has more than adequate range of audio drive to the 3 ohm PM speaker. It should be adjusted with the VOLUME control on the control unit set at maximum volume. Then, the receiver audio level control is adjusted to a point just below the setting where distortion becomes audible. This provides a full volume range for the control head VOLUME control. If the receiver audio level control must be adjusted in a laboratory test set-up where a speaker is not available, a setting of approximately 90 per cent full volume will approximate the normal adjustment.

4. ALIGNMENT PROCEDURE

A complete receiver alignment procedure, in chart form, is included in this section. Test set-up information, using a Motorola portable test set, is also included with the alignment procedure.

Any 0-50 microampere meter with an equivalent series resistance of 20,000 ohms may be used as a metering device. The meter should be connected from chassis ground to the pin receptacle of the metering socket corresponding to the stage being measured. Refer to the applicable schematic diagram for specific metering pin receptacle information.

5. PRE-OPERATIONAL NOTES

The receiver is aligned to its exact operating frequency before it is shipped from the factory. It should, however, be checked for proper operation before it is placed in service. Make the frequency check described in step 9 of the ALIGNMENT CHART in this section. Also take meter readings for the first five entries in the stage measurement chart. If the readings are beyond the allowable limits, realign the receiver according to the ALIGNMENT CHART.

a. Laboratory Sensitivity Check

Quieting signal is that input signal necessary to reduce the output noise at speaker 20 db. Quieting measurements should be made in a well shielded location in the absence of extraneous electrical noise.

This measurement is important in that it indicates in one measurement that the unit is working normally.

The actual measurement is made by observing the noise voltage at the speaker without any carrier at the antenna. Sufficient carrier is then introduced at the antenna to reduce the output voltage to 1/10 its former value.

To measure the quieting signal accurately, a Motorola Model T1034C Series Signal Generator or equivalent, and a Motorola portable test set are required. A Motorola Transistorized AC Voltmeter (or equivalent) or db output meter suitable for accurate measurement of receiver audio output, is also recommended.

(1) Turn the signal generator "on" and stabilize by a "warm-up" period of 1-1/2 to 2 hours.

(2) Connect the meter plug from the portable test set to the meter receptacle on the chassis.

(3) Place the REC-XMTR-0-50 UA switch in the REC position and the GRID CURRENT-METER-FIELD STRENGTH switch in the METER position on the test set.

(4) Connect the signal generator, adjusted to the desired carrier frequency to the antenna input connector using the coaxial lead and 6 db pad. The exact carrier frequency will be indicated by a zero reading on the test set with the meter switch in position +4 or -4.

(5) Connect the output meter across the voice coil leads (terminals 1 and 2 on the terminal board of the power supply or adapter chassis).

NOTE

If an output meter is not available, the test set may be used to measure receiver output by placing the test set selector switch in position 8 or 11, depending upon the test set used. (Test set measurements are purely relative and will not constitute actual output level readings.)

(6) Turn the SQUELCH control fully counterclockwise (off).

(7) With no signal input to the receiver (signal generator ATTENUATOR control set for zero output) adjust the VOLUME control on the receiver chassis for 0.5 volts of noise output on the audio output meter. (Adjust for a reading of 10.0 if the test set is used for this measurement).

(8) Adjust the output level of the signal generator until the receiver audio output is decreased 20 db (to 0.05 volts on audio output meter) from the reading in step (7). Adjust for a reading of 1.0 if the test set is used for this measurement.

b. Stage Measurement Chart

APPROX. MICROVOLT INPUT	INPUT TO	FREQ. IN MC	METER POSITION	METER READING OR DB
Noise	Antenna	-	1 (2nd IF #3 Grid)	-0.1 to -1
Noise	Antenna	-	2 (1st Limiter Grid)	-10 to -30
Noise	Antenna	-	4 (Discriminator Output)	0 to ±1
Noise	Antenna	-	5 (Discriminator Input)	-12 to -16
Noise	Antenna	-	6 (1st Oscillator Grid)	-12 to -40
0.30 or less	Antenna	F_c	*DB Meter	20 db (quieting)
2.5	Antenna	F_c	1 (2nd IF #3 Grid)	-5
3.0 30	Pin 1 of V101 1st r-f	F_c F_c	*DB Meter 1 (2nd IF #3 Grid)	20 db (quieting) -5
3 80	Pin 6 of V103 1st mixer	5.5	*DB Meter 1 (2nd IF #3 Grid)	20 db (quieting) -5
5 300	Pin 1 of V104 1st i-f	5.5	*DB Meter 1 (2nd IF #3 Grid)	20 db (quieting) -5
5000	Filter	.455	1 (2nd IF #3 Grid)	-5
2000	Pin 1 of V106 2nd i-f -1	.455	1 (2nd IF #3 Grid)	-5
150,000	Pin 1 of V107 2nd i-f -2	.455	1 (2nd IF #3 Grid)	-5

NOTE

A Motorola Model T1034C Signal Generator was used when taking readings on V101, and V104. A Measurements Corp. Model 65B Signal Generator with a Type H-4595 output cable was used when taking all other readings except filter input reading.

*Refer to paragraph 5.a., Laboratory Sensitivity Check, when making this measurement.

TEST EQUIPMENT REQUIRED

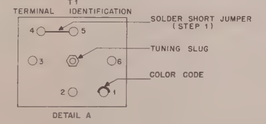
1. Motorola Portable Test Set (S1056A-9A, TU546, P-8500 or P-8501 series, or equivalent).
2. Motorola Signal Generator Model T1034C or equivalent.
3. Motorola TK578 Alignment Tool Kit.
4. Transmitter which this receiver is intended to receive (for frequency adjustment).
5. Power Supply (preferably the one designed for the receiver under test).

HOW TO SET UP THE P-8500 AND P-8501 SERIES TEST SETS FOR DISCRIMINATOR AND 455 KC ALIGNMENT

1. Set the REC-XMTR-0-50 UA switch to the REC position.
2. Plug a 455 kc crystal into the two-pin crystal socket.
3. Set the GRID CURRENT-METER-FIELD STRENGTH selector switch to the GRID CURRENT position.
4. Set the ATTENUATOR control for maximum output (10).
5. Place the test set ON-OFF switch in the ON position. (Test set operates on internal battery. Conserve battery life by keeping switch OFF when set is not in use.)
6. Adjust the frequency control (ADJ) for a maximum meter reading.
7. Set the ON-OFF switch to the OFF position.
8. Set the GRID CURRENT-METER-FIELD STRENGTH switch to the METER position.
9. Plug the test set metering cable into the METER receptacle on the receiver chassis.
10. Connect one end of the test set extension cable to the RF OUTPUT jack on the test set. Connect the other end of the extension cable to the r-f probe cable.

HOW TO SET UP THE S1056A-9A OR TU546 SERIES TEST SET FOR DISCRIMINATOR AND 455 KC ALIGNMENT

1. Set the function selector switch to the RCVR position.
2. Connect the 20-pin metering cable into the receptacle on the test set. Plug the other end (11-pin) into the metering socket on the receiver. When not using the test set, disconnect the 20-pin meter cable to conserve internal battery life. This plug completes battery circuit acting as "ON-OFF" switch.
3. Connect one end of the test set r-f extension cable to the r-f connector on the test set. Connect the other end of the extension cable to the r-f probe cable.
4. Place the oscillator and meter reversing switch to the 455 kc position.



FREQUENCY CALCULATIONS

For the 25-40 mc range:

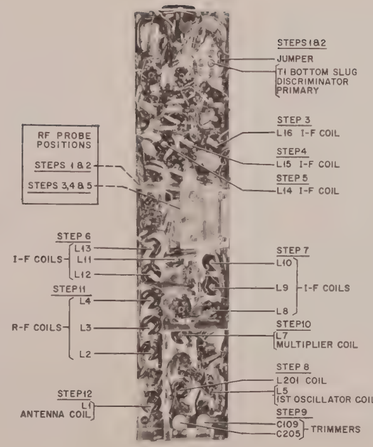
$f_o = f_c + 5.5$ mc

For the 40-54 mc range:

$f_o = f_c - 5.5$ mc

Where: f_o = oscillator crystal frequency

f_c = carrier frequency

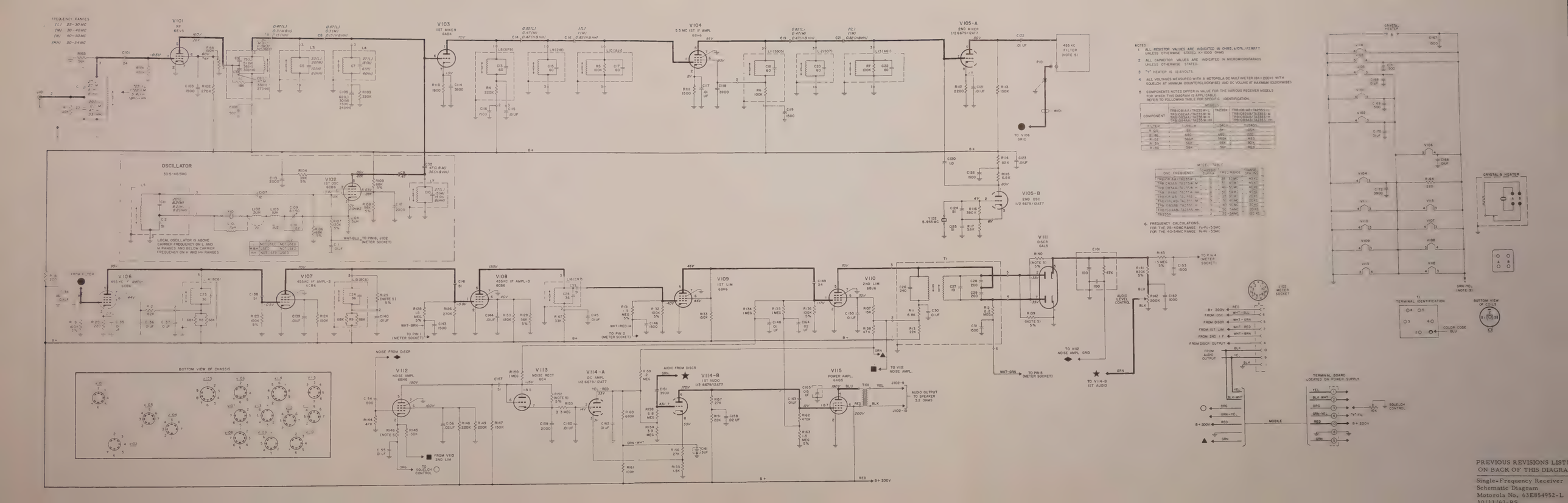


HOW TO SET UP THE SIGNAL GENERATOR FOR 5.5 MC IF ALIGNMENT

1. Set the signal generator frequency for approximately 5.5 mc.
2. Couple the signal generator output loosely to the grid (pin 7) of V105. Couple just enough input to give a small increase in meter reading with selector switch in position 1 or 2.
3. Set the test set selector switch to position 4.
4. Locate the exact 5.5 mc point by rotating the generator dial back and forth around the 5.5 mc setting until a meter reading of exactly zero (position 4) is obtained. The meter reading should go above and below zero as the dial is rotated. Leave the generator set for zero meter reading and check throughout the alignment (generator may drift).

ALIGNMENT PROCEDURE

STEP	STAGE, TEST CONDITIONS AND PROCEDURE	ALIGNMENT PROCEDURE	ADJUSTMENT	S1056A-9A OR TU546 TEST SET SWITCH POSITION	METER READING
1	DISCRIMINATOR PRIMARY - - Solder a short jumper across terminals 4 and 5 of the discriminator secondary coil (see DETAIL A, at the left). Set up the Motorola Test Set as described in the left hand column. Place the test set selector switch in position 1 and set the ON-OFF switch to the ON position. Move the r-f probe around near pin 1, V106, until the meter reading is at least 15 ua. Secure the probe in its position and place the selector switch in position 5. Adjust T1 for maximum meter reading. Unsolder and remove the jumper.	455 kc, sharp tuning	T1 bottom slug	5 Discr Input	Maximum
2	DISCRIMINATOR SECONDARY - - With the r-f probe placed as in step 1 adjust the top slug of T1 for exactly zero meter reading (selector switch in position 4).	455 kc, sharp tuning	T1 top slug	4 Discr. Output	Zero
3	455 KC IF COIL L16 - - Place the r-f probe near the input to 455 kc i-f filter. Couple the signal loosely so that an increase of signal strength will produce a linear increase in meter reading (switch in position 1 or 2). Secure the probe in position to keep the input at a constant level. Adjust L16 for a maximum meter reading with the switch in position 2.	455 kc, sharp tuning	L16	2 1st Lim Grid	Maximum
4	455 KC IF COIL L15 - - Couple the signal to the i-f filter so as to obtain a maximum reading of approximately 5 ua with a selector switch in position 1. Adjust L15 for a maximum reading.	455 kc, broad tuning	L15	1 2nd IF #3 Grid	Maximum
5	455 KC IF COIL L14 - - Use the same conditions as in step 4. Adjust L14 for a maximum meter reading. Place the test set ON-OFF switch in the OFF position and remove the r-f probe	455 kc, sharp tuning	L14	1 2nd IF #3 Grid	Maximum
6	5.5 MC IF COILS L13, L12 and L11 - - Set up the Model T1034C Series Signal Generator (or equivalent) as described to the left. After adjusting the signal generator set the test set selector switch to position 1 or 2 and couple the generator output to the grid (pin 1) of V104. The signal must be coupled loosely so that an increase of signal strength produces a linear increase in meter reading (position 1 or 2). Adjust L13 for a maximum meter reading with switch in position 1 or 2, note that two peaks are present within the coil tuning range. The peak found when the slug is nearest the top of the coil is the proper alignment peak. Adjust L12 and L11 for a maximum meter reading (position 1 or 2).	5.5 mc, sharp tuning	L13, L12 and L11	1 or 2 2nd IF #3 Grid or 1st Lim Grid	Maximum
7	5.5 MC IF COILS L10, L9 and L8 - - Follow the same procedure as in step 6 except couple the signal to the grid (pin 6) of V103 and adjust L10, L9 and L8; no double peaks will be found.	5.5 mc, sharp tuning	L10, L9 and L8	1 or 2 2nd IF #3 Grid or 1st Lim Grid	Maximum
8	FIRST OSCILLATOR COIL L5 - - Uncouple the signal generator. Position the ceramic trimmer, C109, so that the screwdriver adjustment slot is parallel with the length of the receiver chassis. Adjust coil L5 for a maximum meter reading with the selector switch in position 6. If 2-frequency, set F1-F2 switch on control head to F1 position while adjusting L5. Then place the F1-F2 switch in the F2 position while adjusting trimmer C205 in the same manner as C109 above. Adjust coil L201 for a maximum meter reading.	Receiver crystal frequency, sharp tuning	L5 (L201)	6 1st Osc Grid	Maximum
9	FREQUENCY CHECK - - Transmit the carrier frequency from the transmitter which this receiver is normally intended to receive. A zero meter reading with switch in position #4 indicates that the receiver is on frequency. Adjust trimmer C109 (F1-F2 switch in F1 position) to obtain a zero meter reading. Check the final setting by rotating C109 back and forth while observing the meter. The reading should be above and below the zero point as the trimmer is rotated. Set C109 for exactly zero meter reading. On 2-frequency receivers, adjust C205 for the number 2 frequency.	Carrier frequency, sharp tuning	C109 (C205)	4 Discr. Output	Zero
10	MULTIPLIER COIL L7 - - The signal generator must be set to the exact carrier frequency of the receiver. Loosely couple the generator output to the grid (pin 6) of V103; adjust L7 for maximum meter reading (position 1 or 2).	Carrier frequency, sharp tuning	L7	1 or 2 2nd IF #2 Grid or 1st Lim Grid	Maximum
11	RF COILS L4, L3 and L2 - - Keep the signal generator set for the carrier frequency as in step 10. Couple the signal loosely to the grid (pin 1) of V101. Adjust L4, L3 and L2 for maximum reading (position 1 or 2).	Carrier frequency, sharp tuning	L4, L3, and L2	1 or 2 2nd IF #3 Grid or 1st Lim Grid	Maximum
12	ANTENNA COIL L1 - - Connect the signal generator output (set to the exact carrier frequency) to the antenna receptacle on the receiver chassis. Use a 6 db, 50 ohm, attenuation pad between the generator and the receiver input. Adjust L1 for maximum reading (position 1 or 2).	Carrier frequency, sharp tuning	L1	1 or 2 2nd IF #3 Grid or 1st Lim Grid	Maximum
13	IGNITION NOISE ADJUSTMENT - - Install the receiver in the vehicle. Start the vehicle engine and allow it to run while making the adjustments. Turn the receiver ON and allow it to warm up for five minutes. Radiate a carrier frequency signal from a transmitter, signal generator or test set (see test set instruction manual). The signal should be just strong enough to produce quieting (20 to 30 db). Turn VOLUME control on control head to normal usable level. Plug the test set metering cable into the METER receptacle on the receiver. Set the selector switch to position 2 and note the meter reading. Adjust coil L14 very slightly to reduce audible ignition noise. DO NOT reduce the meter reading more than one-half microampere.	Carrier frequency, slight adj.	L14	2 1st Lim Grid	Reduce audible noise


FREQUENCY RANGES
(L) 25-30 MC
(M) 30-40 MC
(N) 40-50 MC
(MH) 50-54 MC
V101 RF 6EV5
V102 1ST OSC 6BA6
OSCILLATOR 30.5-48.5MC
LOCAL OSCILLATOR IS ABOVE CARRIER FREQUENCY ON L AND M RANGES AND BELOW CARRIER FREQUENCY ON H AND MH RANGES
V103 1ST MIXER 6BA6
V104 5.5 MC 1ST IF AMPL 6BH6
V105-A 2ND MIXER 1/2 6679/12AT7
V105-B 2ND OSC 1/2 6679/12AT7
V106 455 KC IF AMPL 6BH6
V107 455 KC IF AMPL-2 6BH6
V108 455 KC IF AMPL-3 6CB6
V109 1ST LIM 6BH6
V110 2ND LIM 6BJ6
V111 DISCR 6AL5
V112 NOISE AMPL 6BH6
V113 NOISE RECT 6C4
V114-A DC AMPL 1/2 6679/12AT7
V114-B 1ST AUDIO 1/2 6679/12AT7
V115 POWER AMPL 6AQ5
455 KC FILTER (NOTE 5)
TO V106 GRID
TO V111 NOISE AMPL GRID
TO V114-B 1ST AUDIO
TO PIN 4 METER SOCKET
TO PIN 5 METER SOCKET
TO PIN 6 METER SOCKET
TO PIN 1 METER SOCKET
TO PIN 2 METER SOCKET
FROM LIMITER
TO V110 NOISE AMPL.
AUDIO OUTPUT TO SPEAKER 3.2 OHMS
J102-9
J102-10
J102 METER SOCKET
AUDIO LEVEL CONTROL
NOISE FROM DISCR
FROM V110 2ND LIM
TO SQUELCH CONTROL
BOTTOM VIEW OF CHASSIS
CRYSTAL HEATER
CRYSTAL B HEATER
T1 TERMINAL IDENTIFICATION
BOTTOM VIEW OF COILS
COLOR CODE BLU
GRN-YEL (NOTE 3)
TERMINAL BOARD LOCATED ON POWER SUPPLY
MOBILE
B+ 200V
SQUELCH CONTROL
NOTES:
1. ALL RESISTOR VALUES ARE INDICATED IN OHMS, ±10%, 1/2 WATT UNLESS OTHERWISE STATED. K=1000 OHMS
2. ALL CAPACITOR VALUES ARE INDICATED IN MICROMICROFARADS UNLESS OTHERWISE STATED.
3. "V" HEATER IS 12.6 VOLTS
4. ALL VOLTAGES MEASURED WITH A MOTOROLA DC MULTIMETER (8+ 200Ω V) WITH SQUELCH AT MINIMUM (COUNTERCLOCKWISE) AND DC VOLUME AT MAXIMUM (CLOCKWISE).
5. COMPONENTS NOTED DIFFER IN VALUE FOR THE VARIOUS RECEIVER MODELS FOR WHICH THIS DIAGRAM IS APPLICABLE. REFER TO FOLLOWING TABLE FOR SPECIFIC IDENTIFICATION.
6. FREQUENCY CALCULATIONS
FOR THE 25-40 MC RANGE F0=F1+5 MC
FOR THE 40-54 MC RANGE F0=F1-5 MC

COMPONENT	MODEL TRB1GB1AA/TA2351-W-L	TA2354	TRB1GB1AB/TA2355-W-L TRB1GB2AB/TA2355-M TRB1GB3AB/TA2355-H TRB1GB4AB/TA2351-HH
FILTER	455	455	455KC
R-L5	82	39K	100K
R-L6	68Ω	68Ω	68Ω
R-L7	160K	360K	MEG
R-L8	56K	56K	80K
R-L40	56K	56K	82K

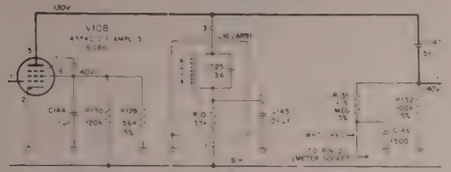
CRYSTAL FREQUENCY	CRYSTAL PART NO.	FREQ. RANGE
TRB1GB1A-B, TA2351-W-L	30 - 41.545 MC	40 KC
TRB1GB2AA/TA2351-W	41 - 48.545 MC	40 KC
TRB1GB3AA/TA2351-W-H	42 - 49.545 MC	40 KC
TRB1GB4AA/TA2351-HH	43 - 50.545 MC	40 KC
TRB1GB1AB/TA2351-L	42 - 51 MC	60 KC
TRB1GB2AB/TA2351-M	43 - 52 MC	60 KC
TRB1GB3AB/TA2351-H	44 - 53 MC	60 KC
TRB1GB4AB/TA2351-HH	45 - 54 MC	60 KC
TA2354	30 - 54 MC	60 KC

PREVIOUS REVISIONS LISTED ON BACK OF THIS DIAGRAM

Single-Frequency Receiver
Schematic Diagram
Motorola No. 63E854952-B
1/31/63 RS

REVISIONS

DIAG ISSUE	CHASSIS AND SUFFIX NO	REF SYMBOL	CHANGE	LOCATION



PARTS LIST for Schematic Diagram 03E854952-L

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
		CAPACITOR, fixed: uuf; 500 v unless otherwise stated
C1L, 5M, 10L, 5HH, 7L	21R11440	27 ±5%
C1M	21R474461	20 ±5%
C1H	21R400073	8 ±.5 uuf
C1HH, 7H, 10HH	21K849319	8 ±.5 uuf; N330
C2L	21R2748	200 ±10%
C2M	21Rb631	100 ±10%
C2H	21R114153	47 ±10%
C2HH	21K855809	33 ±5%; N150
C3L	21D82355B15	75 ±5%; N220
C3M, 7M, 10M, 10H	21K838729	51 ±5%; N80
C3H, 5H	21K834092	36 ±.5 uuf; N330
C3HH	21K82355B07	30 ±.5 uuf; N330
C4L, 6L, 9, 14M, 14H, 14HH, 19M, 19H, 19HH, 32L, 32M	21K849334	.47 ±20%
C4M, 4H, 6H, 6HH	21K830201	3 ±5%
C4HH	21K881064	.15 ±5%
C6L	21R120437	91 ±5%
C7HH	21R400404	1 ±.5 uuf
C11L, 16HH	21K849334	.47 ±20%
C11M, 11H, 11HH	21K847873	.01 ±.5%
C12, 14, 124, 125, 138, 141, 157	21K840711	.01 ±5%
C13, 15, 17, 18, 20, 22	21R400448	.1 ±10%
C14L, 16H, 19L, 21H, 21HH	21K475679	.02 ±10%
C16L, 16M, 21L, 21M, 120	21C83959	.1 ±10%
C23, 24, 25	21R87127	47 ±5%
C26	21K840048	.1 ±10%
C27	21K840811	.01 ±5%
C28, 29	21K840812	.1 ±10%
C30, 31L, 32L	21B801139	.01 uf +80-20%; 600 v
C117, 121, 122, 123, 135, 136, 137, 139, 140, 144, 145, 148, 150, 155, 160, 162, 166, 168, 170		
C31, 103, 108, 116, 119, 126, 143, 146, 153, 167, 169, 171	21B800801	1500 GMV +100% max
C32H, 32HH	21K842041	.36 ±5%
C33L	21D82355B16	68 ±5%; N220
C33M	21K859218	47 ±5%, N75
C33H	21D82355B07	30 ±.5 uuf; N330
C33HH	21K840895	30 ±.5 uuf; N330
C34, 35	21K840365	24 ±5%
C36L	21D82355B18	100 uuf ±5%; 500 v; NPO
C36M	21K849335	150 uuf ±5%; 500 v; NPO
C36H	21D82355B17	200 uuf ±5%; 500 v; N220
C36HH	21R121128	470 uuf ±5%; 500 v
C37	21K847874	24 uuf ±5%; NPO
C38	20B840719	8 mmf, to 50 mmf.
C39	21K84247	2.2 ±10%
C112, 113, 159	21K837746	2000 ±10%
C114, 118, 151, C	21K837996	3900 ±10%
C	8K858371	0.1 uf ±10%, 400 v
C	21K847601	1000 ±5%
C	21K840649	800 ±5%; 300 v
C	21B401029	.02 uf +80-20%
C	23C82601A15	3 uf +150-10%; 100 v
C	8K847105	.01 uf ±20%; 400 v
C	8K859639	.015 uf ±10%; 400 v
C		ASSEMBLY-RES-
E	21K842354	ASSEMBLY: consisting of: dual CAPACITOR, each section 100 uuf; 300 v one RESISTOR fixed: carbon; 47K ±20%

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
J101	9A87120	CONNECTOR, receptacle: female: single contact; round molded mica filled phenolic base; for 1/8" diameter male pin connector
J102	9B86864	female; 11 contact; polarized; round molded black plastic base; chassis mounted; does not include 42A821428 RING, connector retainer; which must be ordered separately
L1L	24K824723	COIL, RF: Antenna; base stamped 723; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C1L, C2L, R1
L1M	24K824722	RF: Ant; base stamped 722; inc. 46K881276 CORE, tuning ORG dot and C1M, C2M, R1
L1H	24K825514	RF: Antenna; base stamped 514; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C1H, C2H, R1
L1HH	24V80900A59	RF: Antenna; base stamped BR1, includes 46K881276 CORE, adjustable tuning; coded RED dot and C1HH, C2HH, R1
L2L	24V80901A19	RF: Plate; base stamped BX1; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C3L, C33L, R2
L2M	24V80901A20	RF: Plate; base stamped BX2; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C3M, C33M, R2
L2H	24V80901A21	RF: Plate; base stamped BX3; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C3H, C33H, R2
L2HH	24V80901A22	RF: Plate; base stamped BX4; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C3HH, C33HH, R2
L3L	24K831221	RF: Coupling; base stamped 221; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C5L
L3M	24K831220	RF: Coupling; base stamped 220; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C5M
L3H	24K825516	RF: Coupling; base stamped 516; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C5H
L3HH	24K825515	RF: Coupling; base stamped 515; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C5HH
L4L	24K824726	RF: Mixer Grid; base stamped 726; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C7L
L4M	24B824336	RF: Mixer Grid; base stamped 336; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C7M
L4H	24K824724	RF: Mixer Grid; base stamped 724; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C7H
L4HH	24K831367	RF: Mixer Grid; base stamped 367; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C7HH
L5L	24B855844	RF: 1st Oscillator; base stamped BC7; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C11L, C12
L5M	24B847871	RF: 1st Oscillator; base stamped AX4; includes 46K881276 CORE, adjustable tuning; coded ORG dot and C11, C12

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
L5H		same as L5M exc. inc. C11H, C12
L5HH		same as L5M exc. inc. C11HH, C12
L7L		same as L4L except Injection and includes C10L
L7M		same as L4M except Injection and includes C10M
L7H		same as L4M except Injection and includes C10H
L7HH		same as L3HH except Injection and includes C10HH
L8	24K837228	IF: 5.5 mc IF - 1; base stamped AF9; includes 46K891111 CORE, adjustable tuning; coded LAV dot and C13, R4
L9	24K830218	IF: 5.5 mc IF - 2; base stamped 218; includes 46K891111 CORE, adjustable tuning; coded LAV dot and C15
L10	24K837470	IF: 5.5 mc IF - 3; base stamped AJ1; includes 46K891111 CORE, adjustable tuning; coded LAV dot and C17, R5
L11	24B825505	IF: 5.5 mc IF - 4; base stamped 5505; includes 46K891111 CORE, adjustable tuning; coded LAV dot and C18
L12	24B825507	IF: 5.5 mc IF - 5; base stamped 507; includes 46K891111 CORE, adjustable tuning; coded LAV dot and C12
L13	24K837229	IF: 5.5 mc IF - 6; base stamped AG1; includes 46K891111 CORE, adjustable tuning; coded LAV dot and C22, R7
L14	24K854048	IF: 2nd IF - 1; base stamped BC6; includes 46K891110 CORE, adjustable tuning; coded GRN dot and C23, R8
L15		same as L14 except 2nd IF - 2 and includes C24, R9
L16	24V80901A62	IF: 2nd IF - 3; base stamped CA7; includes 46K891110 CORE, adjustable tuning; coded GRN dot and C25, C34
L101	24K847869	RF: choke; 1.7 uh; coded BLK-GRN dot
L102, 104	24K847870	RF: choke; .5 uh; coded BLK-VIO dot
L105	24B840042	RF: choke; 1 uh; coded RED-BLK dot
P101	28A474006	CONNECTOR, plug: male, single contact; round brown bakelite wafer insulator; cable mounted
R1, 5, 6, 7, 161	6R6031	RESISTOR, fixed: carbon; unless otherwise stated 100K ±10%; 1/2 w; ins.
R2	6R5591	18K ±10%; 1/2 w; ins.
R4, 113, 118, 119	6R6407	220K ±10%; 1/2 w; ins.
R8, 9	6R6074	68K ±10%, 1/2 w
R11, 115	6R6428	6.8K ±10%; 1/2 w; ins.
R12	6R6433	2.2 meg ±10%; 1/2 w; ins.
R13	6R6397	22K ±10%; 1/2 w; ins.
R101	6R6377	470K ±10%; 1/2 w; ins.
R102, 126	6R6414	270K ±10%; 1/2 w; ins.
R104	6R400076	39K ±5%; 1/2 w; ins.
R105, 109	6R6479	68K ±5%; 1/2 w; ins.
R107	6R2049	120K ±5%; 1/2 w; ins.
R108, 156	6R401006	56K ±5%; 1/2 w; ins.
R110, 158	6R2089	1.8K ±10%; 1/2 w; ins.
R111	6R6038	1.5K ±10%; 1/2 w; ins.
R112	6R6069	2.2K ±10%; 1/2 w; ins.
R113, 124, 133, 145, 147, 166	6R6398	150K ±10%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
R114, 121	6R5644	82K ±10%; 1/2 w; ins.
R116	6R5646	390K ±10%; 1/2 w; ins.
R117	6R6117	5.6K ±10%; 1/2 w; ins.
R118	6R6326	100 ohms ±10%; 1/2 w; ins.
R119, 132, 136 123	6R5553	100K ohms ±10%; 1/2 w ins.
R120, 164	6R6270	220 ohm ±10%; 1/2 w; ins.
R125	6R488095	18K ±5%; 1/2 w; ins.; used only in 40 and 120 kc models
	or6R5553	100K ±5%; used in 20 kc models
R128, 131, 143, 163	6R400228	1.5 meg ±5%; 1/2 w; ins.
R130	6R5631	120K ±10%; 1/2 w; ins.
R134, 135	6R6046	1 meg ±10%; 1/2 w; ins.
R137	6R6477	15K ±10%; 1/2 w; ins.
R138, 144	6R6048	47K ±10%; 1/2 w; ins.
R139, 140	6R401006	56K; used only in 40 and 120 kc models
	or6R2061	180K ±5%; used only in 20 kc models
R141	6R5773	820K ±10%
R142	18K845110	variable: 200K ±20%; 1/4 w
R146	6R6040	680 ohm; used only in 40 and 120 kc models
	or6R6270	220 ohm; used only in 20 kc models
R152	6R5796	560K ±5%; 1/2 w; ins. used only in 40 and 120 kc models
	or6R5587	1 megohm ±5%; 1/2 w; ins. used only in 20 kc models
R153	6R6497	3.3 meg ±10%; 1/2 w; ins.
R154	6R490110	3.9 meg ±10%; 1/2 w; ins.
R156, 157	6R6434	27K ±10%; 1/2 w; ins.
R158	6R2097	6.8 meg ±10%; 1/2 w; ins.
R159	6R400334	12 meg ±10%; 1/2 w; ins.
R160	6R6475	680K ±10%; 1/2 w; ins.
R162	6R6377	47K ±10%; 1/2 w; ins.
R165	6R6378	56K ±10%; 1/2 w; ins.
R167	6R6410	33K ±10%; 1/2 w
T1	1V842353	TRANSFORMER, RF: discrim.; coded BLU dot; inc.; two 76A821495 CORE, adjust tuning; coded YEL dot and C26, C27, C28, C29, C30, C31, R11, R12, R13
T101	25C82804B01	AF: output; 5000 ohm at 55 ma to 3 ohm
V101	95T296A01	ELECTRON TUBE: type 7EV5
V102, 106, 107, 108	95T147A03	type 6CB6
V103	95T212A01	type 6AB4
V104, 109, 112	95T175A01	type 6BH6
V105, 114	95T113A02	type 12AT7
V110	95T176A01	type 6BJ6
V111	95T111A03	type 6AL5
V113	95T179A01	type 6C4
V115	95T101A01	type 6AQ5
W101	1V80711A92	LINE, RF transmission: assembly includes; 30B475378, CABLE RF: coaxial; RG-58A/U; 4-1/4" length required Ref part P101
XV101, 102	9B834083	SOCKET, tube: female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV103, 104	9K87124	7 contact; miniature; molded mica filled phenolic base; saddle mounting includes center shield
XV105	9B881243	9 contact; miniature; molded black phenolic base; saddle mounting; includes center shield and tube shield base
XV106, 107	9K849460	9 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
XV114	9B86868	9 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
XY101	9K857508	SOCKET, crystal: female; 4 contact; square, molded black bakelite base; chassis mounted
XY102	9K861367	2 contact; rectangular; black phenolic base; chassis mounted

FILTER

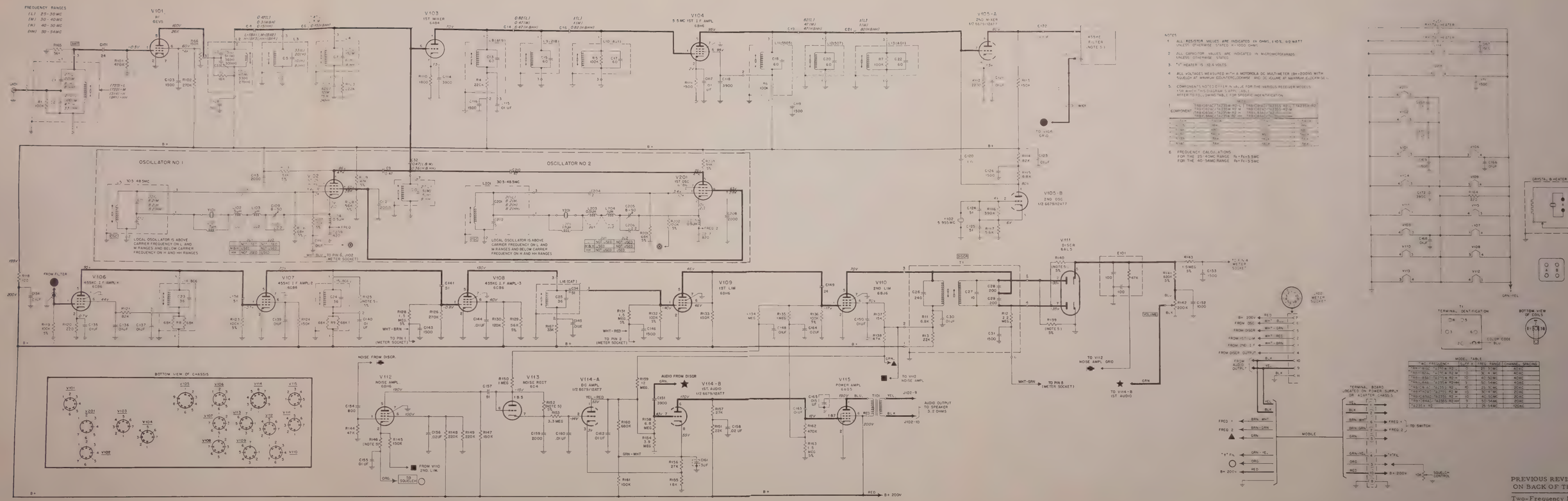
	TU540S	"PERMAKAY" IF Filter; 30 KC Channel Spacing
	TU540W	"PERMAKAY" IF Filter; 60 KC Channel Spacing
	TU540X	"PERMAKAY" IF Filter; 120 KC Channel Spacing

CRYSTAL

Y101	Type RM14A or Type RP14A	CRYSTAL UNIT, quartz: Receiver Control: for 25-40 mc carrier freq; includes 6 volt heater unit
	or	
	Type RM15A or Type RP15A	for 40-54 mc carrier freq; includes 6 volt heater unit
Y102	Type G04	Receiver IF; 5.955 mc

NOTE:

Crystals are part of the Radio Set model. When ordering a receiver chassis only, crystals must be ordered separately. Crystal type number and operating frequency must be specified when ordering crystal.


FREQUENCY RANGES
(L) 25-30 MC
(M) 30-40 MC
(H) 40-50 MC
(HH) 50-54 MC
V101
RF
6EV5
V102
OSCILLATOR NO. 1
OSCILLATOR NO. 2
V103
1ST MIXER
6AH4
V104
5.5 MC 1ST I.F AMPL
6BH6
V105-A
2ND MIXER
1/2 6679/12AT7
V105-B
2ND OSC
1/2 6679/12AT7
V106
455KC 1 I.F AMPL-1
6CB6
V107
455KC 1 I.F AMPL-2
6CB6
V108
455KC I.F AMPL-3
6CB6
V109
1ST LIM
6BH6
V110
2ND LIM
6BJ6
V111
DISCR
6AL5
V112
NOISE AMPL
6BH6
V113
NOISE RECT
6C4
V114-A
DC AMPL
1/2 6679/12AT7
V114-B
1ST AUDIO
1/2 6679/12AT7
V115
POWER AMPL
6AQ5
V201
1ST OSC
6BH6
FROM FILTER
TO PIN 1 (METER SOCKET)
TO PIN 2 (METER SOCKET)
TO PIN 5 (METER SOCKET)
TO SQUELCH
TO V110 2ND LIM.
TO V112 NOISE AMPL. GRID
TO V114-B 1ST AUDIO
TO V112 NOISE AMPL.
AUDIO OUTPUT TO SPEAKER 3.2 OHMS
B+ 200V
B+
NOISE FROM DISCR.
AUDIO FROM DISCR
BOTTOM VIEW OF CHASSIS
NOTES
1 ALL RESISTOR VALUES ARE INDICATED IN OHMS, ±10%, 1/2 WATT UNLESS OTHERWISE STATED. K = 1000 OHMS.
2 ALL CAPACITOR VALUES ARE INDICATED IN MICROMICROFARADS UNLESS OTHERWISE STATED.
3 "H" HEATER IS 12.6 VOLTS.
4 ALL VOLTAGES MEASURED WITH A MOTOROLA DC MULTIMETER (8K+200V) WITH SQUELCH AT MINIMUM COUNTERCLOCKWISE AND DC VOLUME AT MAXIMUM CLOCKWISE.
5 COMPONENTS NOTED DIFFERENTLY FOR THE VARIOUS RECEIVER MODELS. FOR EACH TYPE DIAGRAM SYMBOL ONLY, REFER TO FOLLOWING TABLE FOR SPECIFIC IDENTIFICATION.
COMPONENT
R1
R101
R102
R103
R104
R105
R106
R107
R108
R109
R110
R111
R112
R113
R114
R115
R116
R117
R118
R119
R120
R121
R122
R123
R124
R125
R126
R127
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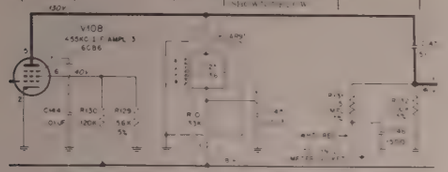
R153
R154
R155
R156
R157
R158
R159
R160
R161
R162
R163
R164
R165
R166
R167
R168
C1
C101
C102
C103
C104
C105
C106
C107
C108
C109
C110
C111
C112
C113
C114
C115
C116
C117
C118
C119
C120
C121
C122
C123
C124
C125
C126
C127
C128
C129
C130
C131
C132
C133
C134
C135
C136
C137
C138
C139
C140

REVISIONS

DIAG ISSUE	CHASSIS AND SUFFIX NO	REF SYMBOL	CHANGE	LOCATION
N	TRB1081,2,3,4AC TRB1081,2,3,4AD			IF CAN EL... R-PLATE
N1				NOTE 4
P	TRB1 [illegible]			V1-1 CONTROL GRID



PARTS LIST for Schematic Diagram 63Ed4953-P

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed: [illegible] stated;
C1L, 7L, 10L	23P114446	cer tub, [illegible]
C1M, 5M	23P474461	cer tub, [illegible]
C1H, 5HH, 10HH	23P400075	cer tub, .8 uuf ±.5 uuf; 500 v
C1HH, 7H	21K842419	cer .8 uuf ±.5 uuf, 500 v; N330
C2L	21K8248	molded silver mica; 200 uuf ±[illegible], 500 v
C2M	21R6631	molded silver mica, 100 uuf ±[illegible]
C2H	21R114153	cer. tub., 47 uuf ±10%, 500 v
C2HH	21K855809	cer. 33 uuf ±5%, 500 v, N150
C3L	21D82355B17	cer. 75 uuf ±5%, 500 v, N220
C3M, 7M, 10M, 12M	21K838729	cer. 51 uuf ±5%, 500 v, N80
C3HH	21K834092	cer. 36 uuf ±.5 uuf; 500 v; N330
C4HH	21D82355B07	cer. 30 uuf ±.5 uuf, 500 v, N330
C4L, 11L, 5L, 14M, 14HH, 17M, 20H, 20HH, 22L, 12M, 21	21K83994	molded phenolic, tub., .47 uuf ±20%, 500 v
C4M, 4H, 6H, 8H, 6HH	21K830201	molded phenolic, tub, ; .3 uuf ±5%, 500 v
C4HH	21K881064	molded phenolic, tub, ; .15 uuf ±5%, 500 v
C6L	21R120437	cer. tub., 33 uuf ±5%, 500 v
C7HH	21R400404	cer. tub., 4 uuf ±.5 uuf; 500 v
C11L, 14HH, 21L	21K849334	cer. disc, 20 uuf ±5%, 500 v
C11M, 11H, 11HH, 201M, 201H, 201HH	21K847873	cer. disc. 8.2 uuf, ±.5%, 500 v
C12, 34, 124, 125, 138, 141, 157, 202	21K840711	molded silver mica, 51 uuf ±5%, 500 v
C13, 15, 17, 18, 20, 22	21R400448	cer. tub., 60 uuf ±10%, 500 v
C14L, 16H, 19L, 21H, 21HH	21K475679	molded phenolic, tub., .82 uuf ±10%, 500 v
C16L, 16M, 21L, 21M, 120	21C83959	molded, tub., 1 uuf ±.2 uuf; 500 v
C23, 24, 25	21R87127	cer. tub., 36 uuf ±5% 500 v
C26	21K840048	molded silver mica, 240 uuf ±5%, 500 v
C27	21K840811	cer. disc, 10 uuf ±5%, 500 v
C28, 29	21K840812	molded silver mica, 200 uuf ±5% 500 v
C30, 111, 115, 117, 121, 122, 123, 135, 136, 137, 139, 140, 144, 145, 148, 150, 155, 160, 162, 166, 168, 170	21B801139	cer. disc, .01 uf +80-20%, 600 v
C31, 103, 108, 116, 119, 126, 143, 146, 153, 167, 169, 171	21B800861	cer. disc, 1500 uuf GMV +100% max, 500 v
C32H, 32HH	21K842041	molded phenolic, tub., .36 uuf ±5% 500 v
[illegible]	21D82355B16	cer. 68 uuf ±5%, 500 v, N220
[illegible]	21K859219	cer. 47 uuf ±5%, 500 v, N75
[illegible]	21D82355B08	cer. 33 uuf ±.5 uuf, 500 v, N330
[illegible]	21K840895	cer. 27 uuf ±.5 uuf, 500 v, N330
[illegible]	21K840365	cer. disc, 24 uuf ±5% 500 v
[illegible]	21D82355B18	62 uuf ±5%, 500 v, NP0
[illegible]	21K849135	30 uuf ±5%, 500 v, N150
[illegible]	21D82355B17	75 uuf ±5%, 500 v, N220
[illegible]	21R121128	24 uuf ±10%, 500 v
C107, 204	21K847874	cer. disc, 12 uuf ±5%, 500 v, NP0
C109, 205	20D840719	var air, 8 uuf min to 50 uuf max
C110, 206	21K84247	molded phenolic, tub., 2.2 uuf ±10%, 500 v
C114, 118, 151, 172	21K837996	cer. disc, 3900 uuf, ±10%, 500 v
C134	8K858371	0.1 uf ±10%, 400 v
C152	21K847601	molded silver mica, 1000 uuf ±5% 500 v
C154	21K840049	molded silver mica, phenolic coated, 800 uuf ±5%, 300 v

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C156, 158, 164	21B401029	cer; disc; .02 uf +80-20%; 500 v
C161	23C82601A15	3 uf +150-10%; 100 v
C163	8K847105	.01 uf ±20%; 400 v
C165	8K859639	.015 uf ±10%; 400 v
C207, 209	21B837745	cer; disc; 820 uuf ±10%; 500 v
E101	21K842354	CAPACITOR-RESISTOR ASSY.; tub.; c/o: dual CAPACITOR, printed circuit, silver paint on cer form; each section 100 uuf; 300 v; one RESISTOR, fixed; carbon; 47K ±20%
J101	9A87120	CONNECTOR, receptacle: female; single contact, round molded mica filled phenolic base; for 1/8" dia. male pin connector
J102	9B86864	female; 11 contact; polarized, round molded black plastic base, chassis mounted, does not incl. 42A821428 RING, connector retainer; which must be ordered separately
L1L	24K824723	COIL, RF: Antenna, base stamped 723; incl. 46K881276 CORE, adjustable tuning, coded ORG dot and C1L, C2L, R1
L1M	24K824722	RF: Antenna, base stamped 722; incl. 46K881276 CORE, adjustable tuning, coded ORG dot and C1M, C2M, R1
L1H	24K825514	RF: Antenna; base stamped 514, incl. 46K881276 CORE, adjustable tuning, coded ORG dot and C1H, C2H, R1
L1HH	24V80900A59	RF: Antenna; base stamped BR1, incl. 46K881276 CORE, adjustable tuning, coded RED dot and C1HH, C2HH, R1
L2L	24V80901A19	RF: Plate, base stamped BX1, incl. 46K881276 CORE, adjustable tuning, coded ORG dot and C3L, C33L, R2
L2M	24V80901A20	RF: Plate, base stamped BX2, incl. 46K881276 CORE, adjustable tuning, coded ORG dot and C3M, C33M, R2
L2H	24V80901A21	RF: Plate, base stamped BX3, incl. 46K881276 CORE, adjustable tuning, coded ORG dot and C3H, C33H, R2
L2HH	24V80901A22	RF: Plate, base stamped BX4, incl. 46K881276 CORE, adjustable tuning, coded ORG dot and C3HH, C33HH, R2
L3L	24K831221	RF: Coupling, base stamped 221, incl. 46K881276 CORE, adjustable tuning, coded ORG dot and C5L
L3M	24K831220	RF: Coupling, base stamped 220, incl. 46K881276 CORE, adjustable tuning, coded ORG dot and C5M
L3H	24K825516	RF: Coupling, base stamped 516, incl. 46K881276 CORE, adjustable tuning, coded ORG dot and C5H
L3HH	24K825515	RF: Coupling, base stamped 515, incl. 46K881276 CORE, adjustable tuning; coded ORG dot and C5HH
L4L	24K824726	RF: Mixer Grid, base stamped 726, incl. 46K881276 CORE, adjustable tuning; coded ORG dot and C7L
L4M	24B824336	RF: Mixer Grid, base stamped 336, incl. 46K881276 CORE, adjustable tuning, coded ORG dot and C7M

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
L4H	24K824724	RF: Mixer Grid; base stamped 724; incl. 46K881276 CORE, adjustable tuning; coded ORG dot and C7H
L4HH	24K831367	RF: Mixer Grid; base stamped 367; incl. 46K881276 CORE, adjustable tuning; coded ORG dot and C7HH
L5L	24B855844	RF: 1st Oscillator, base stamped BC7; incl. 46K881276 CORE, adjustable tuning; coded ORG dot and C11L, C12
L5M	24B847871	RF: 1st Oscillator; base stamped AX4; incl. 46K881276 CORE, adjustable tuning; coded ORG dot and C11, C12
L5H		same as L5M except incl. C11H, C12
L5HH		same as L5M except incl. C11HH, C12
L7L		same as L4L except Injection and incl. C10L
L7M		same as L4M except Injection and incl. C10M
L7H		same as L4M except Injection and incl. C10H
C7HH		same as L3HH except Injection and incl. C10HH
L8	24K837228	IF: 5.5 mc IF - 1; base stamped AF9; incl. 46K891111 CORE, adjustable tuning; coded LAV dot and C13, R4
L9	24K830218	IF: 5.5 mc IF - 2; base stamped 218, incl. 46K891111 CORE, adjustable tuning; coded LAV dot and C15
L10	24K837470	IF: 5.5 mc IF - 3; base stamped AJ1; incl. 46K891111 CORE, adjustable tuning, coded LAV dot and C17, R5
L11	24B825505	IF: 5.5 mc IF - 4; base stamped 5505; incl. 46K891111 CORE, adjustable tuning; coded LAV dot and C18
L12	24B825507	IF: 5.5 mc IF - 5; base stamped 507; incl. 46K891111 CORE, adjustable tuning; coded LAV dot and C12
L13	24K837229	IF: 5.5 mc IF - 6; base stamped AG1; incl. 46K891111 CORE, adjustable tuning; coded LAV dot and C22, R7
L14	24K854048	IF: 2nd IF - 1; base stamped BC6; incl. 46K891110 CORE, adjustable tuning, coded GRN dot and C23, R8
L15		same as L14 except 2nd IF - 2 and incl. C24, R9
L16	24V80901A62	IF: 2nd IF - 3; base stamped CA7, incl. 46K891110 CORE, adjustable tuning; coded GRN dot and C25, C34
L101, 202	24K847869	RF: choke; 1.7 uh, coded BLK-GRN dot
L102, 104, 203, 205	24K847870	RF: choke, .5 uh; coded BLK-VIO dot
L103, 204	24B840042	RF: choke; 1 uh, coded RED-BLK dot
L201L		same as L5L except incl. C201L, C202
L201M		same as L5M except incl. C201M, C202
L201H		same as L5H except incl. C201H, C202
L201HH		same as L5HH except incl. C201HH, C202
P1	28A474006	CONNECTOR, plug; male; single contact, round brown bakelite wafer insulator, cable mounted

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		RESISTOR, fixed: carbon; unl. stated,
R1, 5, 6, 7, 161	6R6031	100K ±10%; 1/2 w; ins.
R2	6R5591	18K ±10%; 1/2 w; ins.
R4, 103, 148, 149	6R6407	220K ±10%; 1/2 w; ins.
R8, 9	6R6074	68K; 2 req'd
R11, 115	6R6428	6.8K ±10%, 1/2 w; ins.
R12	6R6433	2.2 meg ±10%, 1/2 w; ins.
R13, 151	6R6397	22K ±10%; 1/2 w; ins.
R101	6R6377	470K ±10%; 1/2 w; ins.
R102, 126	6R6414	270K ±10%; 1/2 w; ins.
R104, 203	6R400076	39K ±5%; 1/2 w; ins.
R106, 201	6R6479	68K ±5%, 1/2 w; ins.
R107, 202	6R2049	120K ±5%, 1/2 w; ins.
R108, 129	6R401006	56K ±5%; 1/2 w; ins.
R109	6R5772	47K ±5%, 1/2 w; ins.
R110, 155	6R2089	1.8K ±10%; 1/2 w; ins.
R111	6R6038	1.5K ±10%; 1/2 w; ins.
R112	6R6069	2.2K ±10%; 1/2 w; ins.
R113, 124, 133, 145, 147, 166	6R6398	150K ±10%, 1/2 w; ins.
R114, 121	6R5644	82K ±10%; 1/2 w; ins.
R116	6R5646	390K ±10%; 1/2 w; ins.
R117	6R6117	5.6K ±10%; 1/2 w; ins.
R118	6R6326	100 ohm ±10%; 1/2 w; ins.
R119, 123, 132, 136	6R5553	100K ±5%; 1/2 w; ins.
R120, 164	6R6270	220 ohm ±10%, 1/2 w; ins.
R125	6R488095	18K ±5%; 1/2 w; ins.; used only in 40 and 120 kc models
	or 6R5553	100K ±5%; used only in 20 kc models
R128, 131, 143, 163	6R400228	1.5 meg ±5%; 1/2 w; ins.
R130	6R5631	120K ±10%; 1/2 w, ins.
R134, 135, 150	6R6046	1 meg ±10%; 1/2 w; ins.
R137	6R6477	15K ±10%; 1/2 w; ins.
R138, 144	6R6048	47K ±10%; 1/2 w; ins.
R139, 140	6R401006	56K; used only in 40 and 120 kc models
	or 6R2061	180K ±5%; used only in 20 kc models
R141	6R5773	820K ±10%
R142	18K845110	var; 200K ±20%; 1/4 w
R144	6R6040	680 ohm; used only in 40 and 120 kc models
	or 6R6270	220 ohm; used only in 20 kc models
R152	6R5796	560K ±5%; 1/2 w; ins. used only in 40 and 120 kc models
	or 6R5587	1 meg ±5%; 1/2 w; ins.; used only in 20 kc models
R153	6R6497	3.3 meg ±10%; 1/2 w; ins.
R154	6R490110	3.9 meg ±10%; 1/2 w; ins.
R156, 157	6R6434	27K ±10%, 1/2 w; ins.
R158	6R2097	6.8 meg ±10%, 1/2 w, ins.
R159	6R400334	12 meg ±10%; 1/2 w; ins.
R160	6R6475	680K ±10%, 1/2 w; ins.
R162	6R6377	47K ±10%, 1/2 w; ins.
R165	6R6378	56K ±10%, 1/2 w; ins.
R167	6R6410	33K ±10%; 1/2 w
T1	1V842353	TRANSFORMER, RF: discrim.; coded BLU dot; incl. two 76A821495 CORE, adjustable tuning; coded YEL dot and C26, C27, C28, C29, C30, C31, R11, R12, R13
TM1	25C82804B01	AF: output; 5000 ohm at 55 ma to 3 ohm
V101	95T296A01	ELECTRON TUBE: type 6EV5
V102, 106, 107, 108, 201	95T147A03	type 6CB6
V103	95T212A01	type 6AB4
V104, 109, 112	95T175A91	type 6BH6
V105, 114	95T113A02	type 1AT7
V110	95T176A01	type 6BJ6
V111	95T111A03	type 6AL5
V113	95T179A01	type 6C4
V115	95T101A01	type 6AQ5

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
W101	1V80711A92	LINE, RF transmission: assembly incl. 30B475378 CABLE, RF: coaxial; RG-58A/U 4-1/4" length req'd; Ref. part P101
XV101, 102, 201	9B834083	SOCKET, tube: female; 7 contact; miniature; molded mica filled phenolic base; saddle mtg; incl. center shield and tube shield base
XV103, 104	9K87124	7 contact; miniature; molded mica filled phenolic base; saddle mtg; incl. center shield
XV105	9B881243	9 contact; miniature; molded BLK phenolic base; saddle mtg; incl. center shield and tube shield base
XV106, 107	9K849460	9 contact; miniature; molded mica filled phenolic base; saddle mtg; incl. center shield and tube shield base
XV108, 109, 110, 111, 112, 113, 115	9B87123	7 contact; miniature; molded BLK phenolic base; saddle mtg; incl. center shield
XV114	9B86868	9 contact; miniature; molded BLK phenolic base; saddle mtg; incl. center shield
XY101, 201	9K857508	SOCKET, crystal: female 4 contact; square; molded BLK bakelite base; chassis mounted
XY102	9K861367	2 contact; rectangular; BLK phenolic base; chassis mounted

FILTER

	TU540S	"Permakay" IF Filter; 30 kc Channel Spacing
	TU540W	"Permakay" IF Filter; 60 kc Channel Spacing
	TU540X	"Permakay" IF Filter; 120 kc Channel Spacing

CRYSTAL

Y101, 201		CRYSTAL UNIT, quartz: Receiver Control:
	Type RM14A or Type RP14A	for 25-40 mc carrier freq. incl. 12 volt heater unit
	or	
	Type RM15A or Type RP15A	for 40-54 mc carrier freq. incl. 12 volt heater unit
Y102	Type G04	Receiver IF; 5.955 mc

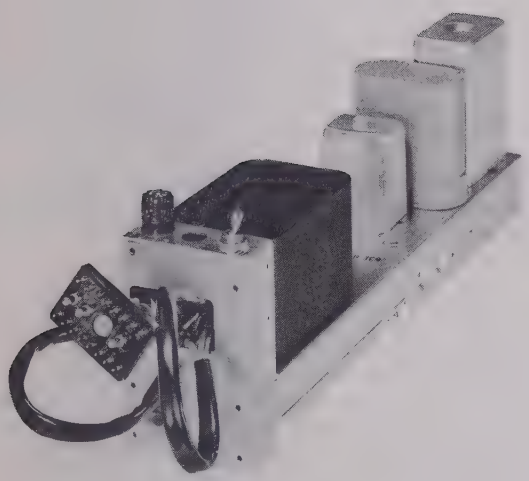
NOTE:

When ordering xtal units specify car. freq.(s), xtal freq.(s) and xtal type no. Xtals are part of the Radio Set Model.

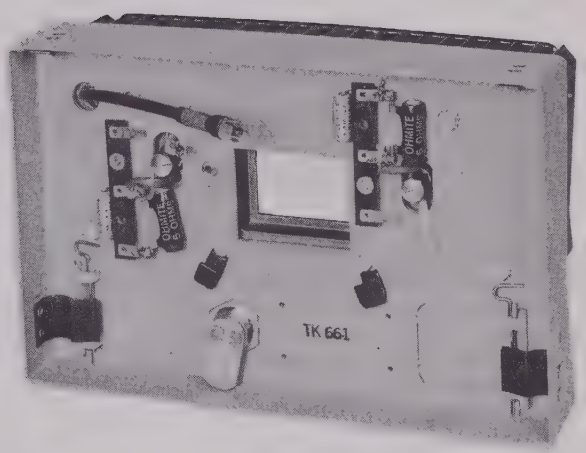
TRANSISTORIZED POWER SUPPLY

AEPD-7873-O

CE978-C



TU588
POWER SUPPLY



TRANSISTORS AND POWER SUPPLY
COMPONENTS ON RADIO SET FRONT PANEL

1. INTRODUCTION

The TU588 is a fully transistorized power supply with a common emitter circuit. It provides all the plate, screen and bias voltages required by the mobile radio transmitter and receiver. The transistorized circuitry replaces the vibrator circuits commonly used in mobile radio applications.

a. Basic Principle

The transistor circuit of the power supply is essentially a single-pole, double-throw switch, operating back and forth continuously. This switching action interrupts the flow of battery current through the power supply transformer primary. Interrupting the d-c gives the effects of a-c and the transformer windings step up the voltages as required for the rectified outputs.

The input is connected to the transistor emitters. The opposite ends of the transformer are connected to the transistor collectors, which alternately open and close the circuit to the d-c input. The current flows first through one transistor, then through the other, giving the effect of an alternating current. This circuit effectively duplicates the action of a vibrator and is used to replace the vibrator circuit.

PERFORMANCE SPECIFICATIONS

INPUT REQUIRED	12 VDC negative or positive ground.
OUTPUT RATINGS	Transmitter:
	High B+ . . . . . 705 v d-c at 120 ma
	Low B+ . . . . . 275 v d-c at 60 ma
	Osc. B+ . . . . . 150 v d-c at 18 ma
	Bias . . . . . -36 v d-c
	Receiver:
	B+ . . . . . 200 v d-c at 70 ma

b. Advantages

The transistorized power supply has several advantages over the conventional vibrator supplies in current use. These advantages are largely due to the life span of the transistor, which greatly exceeds that of even the finest vibrator. This eliminates the cost of vibrator replacement, reduces maintenance, increases the reliability of the radio set and provides higher efficiencies with lower input drains for the same power outputs. With a transistorized power supply there is much less chance of radio failure in service.

In addition, the transistor circuit has a built-in protection factor not found in vibrator supplies. A short in the output does not damage the transistors.

2. DESCRIPTION

The TU588 Power Supply is designed for a 12-volt negative or positive ground electrical system.

The power supply chassis mounts between the transmitter and receiver of the radio set. The d-c input and control circuits are brought in through a 19-pin male connector on the front panel. The various rectified outputs are routed to terminal boards on the wiring side of the chassis for the transmitter and receiver connections. An 18-lug terminal strip on one side is used for the transmitter connections; a 15-lug strip on the other side is for receiver connections.

Two alloy junction PNP transistors--designed for high power audio frequency applications--are connected in an electronic switching circuit which is basically a multivibrator. The operating frequency is in the audio range.

The transistors are mounted on a cast-aluminum radiator (called a "heat-sink") on the front panel of the radio set. The radiator conducts heat away from the transistors, permitting them to operate safely at relatively high ambient temperatures. The heat-dissipating capacity of the heat-sink provides safe operation under the most adverse temperature conditions normally encountered in mobile radio operation.

CAUTION

A transistor feedback circuit in this power supply is enclosed in a protective cover. The cover prevents accidental shorting of the enclosed components with consequent damage to the transistors. Do not remove this cover unless necessary for servicing components. Always replace the cover before restoring operation. Never operate the power supply with the cover removed.

3. OPERATION

a. Introduction

The function of the mobile power supply is to convert the low-voltage d-c input to the various high-voltage d-c outputs required for operation of the transmitter and receiver. This is accomplished in three stages. First, the transistor

circuit changes the d-c into a-c, then the power transformer steps up the voltage of the a-c, and finally the rectifier-filter network converts the high voltage a-c to d-c.

b. Transistor Multivibrator Circuit

(1) Function

The function of the transistor multivibrator circuit is to change the pure d-c input into pulsating d-c, a form of a-c, so that it can be stepped-up in voltage by transformer action. The operation is illustrated in the simplified functional diagram, Figure 1. The diagram shows a negative ground electrical system. For a positive ground electrical system, reverse the leads to the polarity reversing terminals.

(2) Operation

The ON-OFF switch at the control head connects the 12 volt d-c input to pin #19 of the power and control plug on the power supply. When the switch is ON, the d-c input is applied to two points: (a) the feedback network used in the "receive" condition, and (b) the center tap of the main transformer winding.

(a) Feedback Path

The path through the "receive" feedback network leads to the center tap of the feedback winding of the transformer. The opposite ends of this transformer winding are connected to the two transistor base elements. The 330 ohm starting resistor is connected between the center tap and the d-c input. Current flows through the feedback network and starting resistor, applying a bias to the base elements of each transistor. Due to a slight unbalance in transistor conductivity, one will tend to conduct more heavily than the other. This is the effect which starts the oscillation cycle.

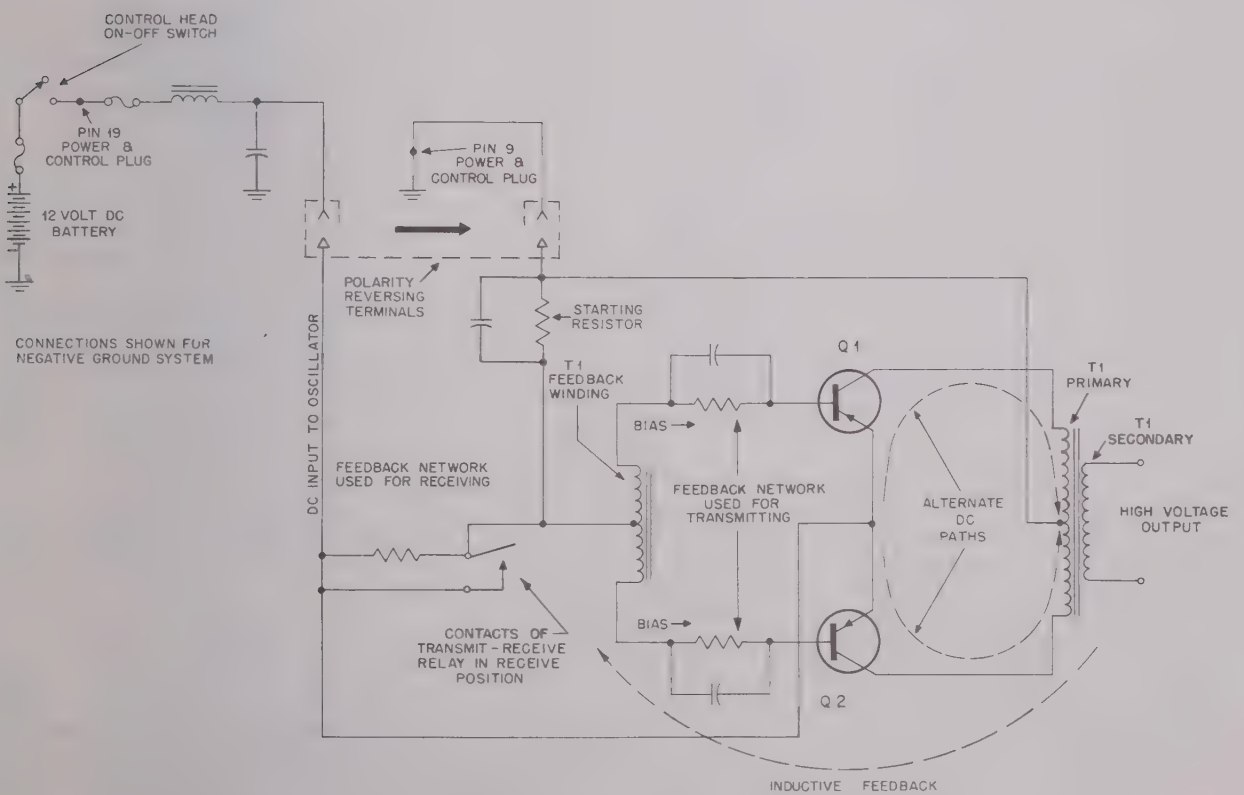


FIGURE 1

(b) Transformer Primary Path

The d-c path through the center tap of the main transformer primary winding leads to the two transistor collector elements, which are connected to opposite ends of the winding. The slight unbalance in transistor conductivity causes more current to flow through one primary half-winding than through the other. The current path is through the primary half-winding and the transistor (emitter to collector) to the d-c input. The current in the transformer half-winding induces voltages in the two feedback half-windings. Polarity is such that the more heavily conducting transistor is quickly biased to full conduction; the other transistor is quickly driven to cut-off.

(3) Oscillation Cycle

The induced feedback voltage drops to zero as the current through the conducting transistor reaches the point of saturating the transformer core. The cut-off transistor begins to conduct, reversing the polarity of the voltage in the feedback windings and conduction through this transistor increases inducing greater feedback bias and quickly cutting off the first transistor. Current through the second transistor then reaches core saturation, completing a cycle of oscillation. The circuitry is designed for self-sustaining, continuous oscillation as long as the d-c input is applied. First one transistor conducts to core saturation, then the other. Thus, the current alternates between the two primary half-windings. The switching action is very rapid and the voltage induced in the feedback winding of the transformer approximates a typical "square wave" pattern. The overall effect of the transistor oscillator circuit is essentially that of a single-pole, double-throw switch operating back-and-forth continuously.

(4) Feedback Networks

Two feedback networks are used in this circuit, one for the "receive" condition, the other for the "transmit" condition. These networks provide the proper bias for both receive and transmit conditions. The transmit feedback network is used in both transmit and receive conditions. However, in transmit condition, closed contacts of the transmit-receive relay by-pass the receive feedback network, thus utilizing only the transmit feedback network.

c. Power Transformer

The main purpose of the power transformer is to provide a high voltage a-c output with a low-voltage a-c input. A special transformer is used in this power supply to provide the feedback required for the transistor oscillator circuit in addition to the high voltage a-c output. There are two separate high voltage secondaries for the B+ outputs and one low-voltage secondary for the bias supply.

d. Rectifier-Filter Networks

Refer to Schematic Diagram 63E856462.

(1) Receiver B+ Section

The receiver B+ rectifier-filter network converts the high voltage a-c induced in the transformer secondary to a smooth d-c output required for the receiver plate circuits. This section consists of a full-wave silicon bridge rectifier (CR9, CR10, CR11 and CR12) a "pi" section filter and a bleeder resistor.

The high voltage a-c is connected to opposite corners of the bridge circuit. On one half-cycle rectifier CR9 conducts toward the transformer and CR12 conducts in the direction of the filter and load, which completes the circuit to ground. On the other half-cycle CR11 conducts toward the transformer and CR10 conducts current toward the filter. The filter network smoothes out the ripple in voltage and current.

The output of this section is connected to a set of normally closed contacts of relay K1 in the de-energized (receive) condition. These contacts route the output to the B+ terminals of the receiver terminal board. B+ is applied to the receiver continuously except when the transmitter is turned on. Relay K1 is then energized and the receiver is muted, since its B+ circuit is broken. The relay contacts then switch the B+ output to the transmitter terminal board, where the B+ is used for the transmitter oscillator stage during the "transmit" period.

The lamp, I1, in this circuit is essentially a fuse. If an overload occurs, the lamp burns out.

(2) Transmitter B+ Section

The transmitter B+ section provides high and low B+ outputs to the transmitter when the transmit-receive relay (K1) is energized. Pressing the push-to-talk button operates this relay and its contacts complete the circuit to the bridge rectifier, CR1 to CR8. The rectifier bridge output is connected so that its B+ output is added to

the output of the multiplier B+ section, providing a transmitter B+ of approximately 705 volts. This output is filtered and routed through closed contacts of relay K1 to the transmitter PA B+ terminal, TB2-10.

The full winding of the transformer secondary provides an intermediate B+ source for the transmitter multiplier stages. The bridge network consisting of CR9 to CR12 is used as the rectifier in this circuit. The multiplier B+ output is filtered and routed through terminals of relay K1 to the multiplier B+ terminal, TB2-11. The transmitter oscillator voltage is obtained from the same source as the multiplier B+, however, the higher multiplier B+ is fed through a dropping resistor network and through contacts of relay K1 to the transmitter oscillator terminal, TB2-6.

(3) Transmitter Bias Section

The transmitter bias section includes a low-voltage secondary of transformer, T1, rectifier CR13 and a filter network. The -36 volts bias output appears on TB2-13 for connection to the transmitter PA grid circuit.

The HI-LO switch is in the transmitter (PA screen) circuit. The HI position is the normal operating position. The LO position is used for transmitted tuning purposes before the final amplifier of the transmitter is fully aligned.

e. Relay Operation

The transmit-receive relay, K1, is a 12 volt d-c relay. One side of the relay coil is connected to the 12 volt bus. To energize the relay, the other side of the coil must be grounded.

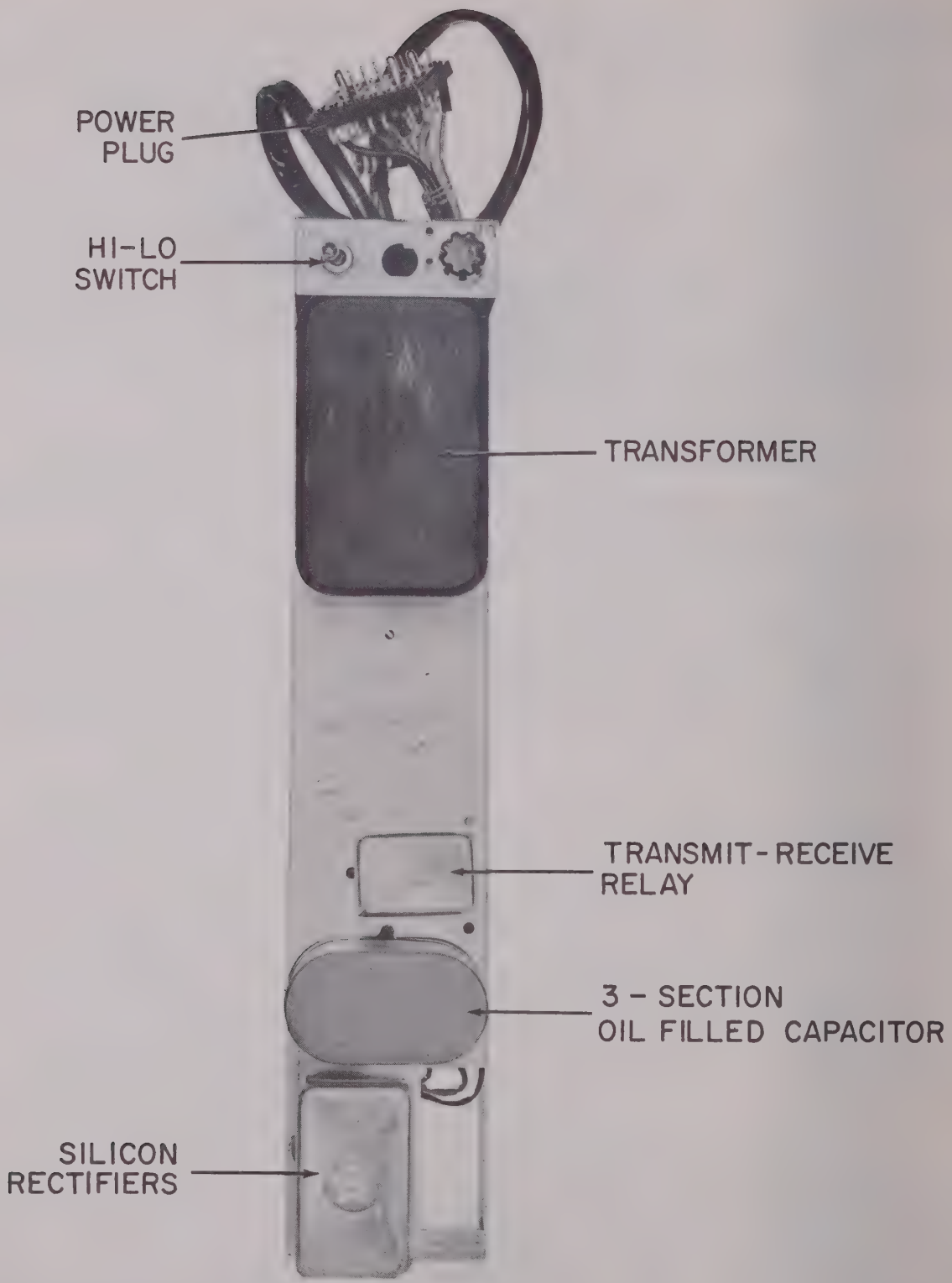
In the de-energized condition, all operating voltages for the receiver are supplied through the contacts of the relay. When the push-to-talk circuit is grounded, the relay becomes energized and the relay contacts are switched. The switching removes the B+ voltage from the receiver and supplies operating voltages to the transmitter final stages. Therefore, the receiver is muted and the transmitter is turned on when the relay is energized.

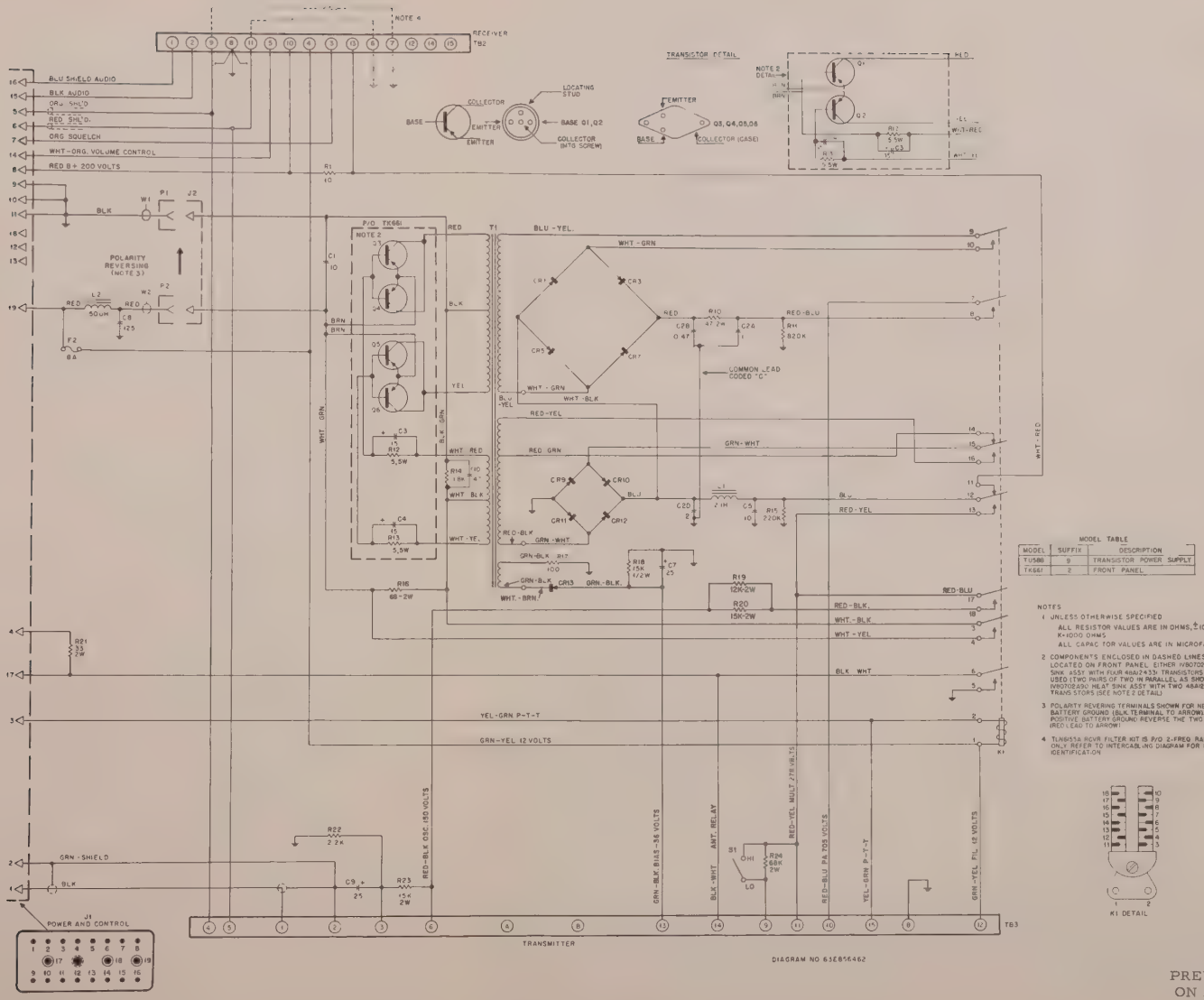
4. TRANSISTOR CHECKING

A short in a transistor is the most frequent cause of transistor failure. A simple check can be made as follows:

Connect a multi-meter between the emitter and collector of the transistor. If the transistor is shorted, the meter will read less than one ohm.

If a transistor requires replacement, refer to the INSTALLATION AND OPERATION section of this instruction manual for transistor replacement procedures.


POWER PLUG
HI-LO SWITCH
TRANSFORMER
TRANSMIT-RECEIVE RELAY
3 - SECTION OIL FILLED CAPACITOR
SILICON RECTIFIERS



MODEL TABLE

MODEL	SUFFIX	DESCRIPTION
TU586	9	TRANSISTOR POWER SUPPLY
TX661	2	FRONT PANEL

NOTES

1 UNLESS OTHERWISE SPECIFIED
ALL RESISTOR VALUES ARE IN OHMS, ±10%, ½ WATT
K=1000 OHMS
ALL CAPAC TOR VALUES ARE IN MICROFARADS

2 COMPONENTS ENCLOSED IN DASHED LINES ARE LOCATED ON FRONT PANEL. EITHER #R6702A89 HEAT SINK ASSY WITH FOUR 48A2433 TRANSISTORS MAY BE USED (TWO PAIRS OF TWO IN PARALLEL AS SHOWN) OR #R6702A90 HEAT SINK ASSY WITH TWO 48A2437B TRANS STORS (SEE NOTE 2 DETAIL)

3 POLARITY REVERING TERMINALS SHOWN FOR NEGATIVE BATTERY GROUND (BLK TERMINAL TO ARROW) FOR POSITIVE BATTERY GROUND REVERSE THE TWO TERMINALS (RED LEAD TO ARROW)

4 TLN6553A RCVR FILTER KIT IS P/O 2-FREQ RADIO SET ONLY REFER TO INTERCABLING DIAGRAM FOR PARTS IDENTIFICATION

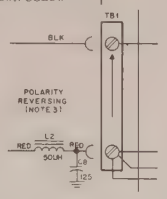
K1 DETAIL

PREVIOUS REVISIONS LISTED ON BACK OF THIS DIAGRAM

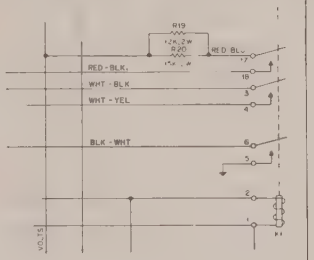
Power Supply
Schematic Diagram
Motorola No. 63E856462-M
4/3/64-RS

REVISIONS

DIAG ISSUE	CHASSIS AND SUFFIX NO	REF SYMBOL	CHANGE	LOCATION
H			RESISTOR & CAPACITOR VALUES OF TLN6155A REMOVED FROM SCHEMATIC. SEE NOTE 4.	J1 & TB2
J	TU588-6	F1	REMOVED 15 AMP FUSE	J1-19
		XF1	REMOVED 9B865564	
L	TU588-6	XF2	WAS 9B865564	PARTS LIST
K	TU588-7	CR1, 3, 5, 7	WERE 48K859727	PARTS LIST
		CR9, 10, 11, 12	WERE 48K859708	
		CR13	WAS 48K859726	
M	TU588-8	TB1	REMOVED 31A858233	POLARITY REVERSING
		J2	ADDED LUG, RECP	J1-11, 19
		P1, P2	ADDED LUG, CONN	
		W1	ADDED 1V80720A40	
		W2	ADDED 1V80720A22 CIRCUIT WAS AS SHOWN BELOW	



N	TU588-9	R19, R20	RELOCATED CIRCUIT WAS AS SHOWN BELOW	



PARTS LIST for Power Supply Diagram 63E856462-M

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
C1	23K859299	CAPACITOR, fixed: 10 uf +75-15%; 25 v
C2	8K861326	consists of: 1 uf ±20%; 900 v .47 uf ±20%; 900 v common 2 uf ±20%; 400 v
C3, 4	23K858677	15 uf +100-10%; 10 v
C6	23K837903	10 uf +50-10%; 450 v
C7	23K839917	25 uf +100-10%; 100 v
C8	23K840707	125 uf +100-10%; 18 v
C9	23K850516	25 uf +100-10%; 50 v
C10	8K861614	.47 uf ±10%, 100 v
CR1, 3, 5, 7	48D82723C05 or 48D82383B01	SEMICONDUCTOR DEVICE, diodes; SEE NOTE 1 silicon; 500 v
CR9, 10, 11, 12	48D82723C04 or 48D82383B03	silicon, 400 v
CR13	48D82723C09 or 48D82383B05	silicon, 150 v
F2	65K475248	FUSE, cartridge: slow blow type; 8 amp; 32 v;
J1	28C802820	CONNECTOR, receptacle: male; 19 contact;
J2		LUG receptacle: consists of: 14A859012 INSULATOR receptacle lug 29A859005 LUG, receptacle; 2 req'd. 5S7700 RIVET; 2 req'd.
K1	80K858550	RELAY, armature: dual stack; contact arrangement: 1st stack, 1 form "A", 2nd stack, 4 form A coil res 100 ohms; does not incl 15K848892 COVER relay, or 7A811735 BRACKET, relay cover mounting; cover and bracket must be ordered separately
L1	25B847416	REACTOR: filter; 2.1 henries at 100 ma . d-c
L2	25B861376	COIL AF: choke; 50 uh
P1, 2		LUG, connector: consists of: 29A859118 LUG, connector 14A859051 INSULATOR, lug protector
Q1, 2	48A124376	TRANSISTOR; SEE NOTE 1 P-N-P
Q3, 4, 5, 6	48A124331	P-N-P
R1	6R118205	RESISTOR: fixed: ±10%, 1 w. ins., unless otherwise stated 10 ±20%
R10	6R488035	47; 2 w
R11	6R2053	[illegible]
R12, 13	17K858769	[illegible]
R14	6R5620	[illegible]
R15	6R5574	[illegible]
R16	6R118239	[illegible]
R17	6R6415	[illegible]
R18	6R6477	15K; 1/2 w
R19	6R5766	12K, 2 w
R20, 23	6R5732	15K, 2 w
R21	6R488016	33; [illegible]
R22	6R6409	[illegible]
R24	6R2079	[illegible]
S1	40A482093	switch, toggle: [illegible]

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
T1	25D858644	TRANSFORMER, power: consists of the following windings: pri #1: YEL, RED leads with BLK center tap; total res .031 ohms pri #2: WHT-RED, WHT-YEL leads with WHT-BLK center tap; total res .040 ohms sec #1: BLU-YEL, BLU-YEL leads; res 21.5 ohms sec #2; RED-BLK, RED-YEL leads with RED-GRN tap; total res 12.6 ohms sec #3: GRN-BLK, GRN-BLK leads; res 2.26 ohms
TB2	31B802699	BOARD, terminal: 14 solder lug term; board coded 1 to 15
TB4	31B851408	17 solder lug term; board coded B, A, and 1 to 16
W1	1V80720A40	LEAD, electrical: includes ref. part P1 and 10M456 WIRE, electrical: #16 ga. BLK; 9" req'd.
W2	1V80720A22	includes ref. part P2 and 10M458 WIRE, electrical; #16 ga. RED; 5" req'd.
XQ3	9D82673A01	SOCKET, transistor: female, 2 contact
XF2	9C82083C02	FUSEHOLDER: extractor post type; includes mounting hardware
NON-REFERENCED PARTS		
	1V865695	RECTIFIER MOUNTING BOARD ASSEMBLY, riveted; includes: 31A865187 MOUNTING BOARD ASSEMBLY; includes 4 pairs of terminal clips for mounting 4 diodes; 2 req'd 7B858571 BRACKET, mounting board
	7D82675A01	RADIATOR, transistor mounting
	14A851751	INSULATOR, transistor; (Q1, Q2)
	14A865854	INSULATOR, transistor; (Q3, Q4, Q5, Q6)

NOTE

Replacement transistors and diodes must be ordered by Motorola part number only for optimum performance.

ROUTINE MAINTENANCE

1. INTRODUCTION

Experience has shown that there is a particular way of maintaining 2-way radio communications equipment that is far superior to any other in achieving maximum operating efficiency and reliability at least cost.

This procedure is known as "System Maintenance", which simply means that the inspection and maintenance of all units constituting the whole is conducted in an established and orderly fashion. The procedure should be conducted at regular intervals in order to yield all of the well-known benefits of preventive maintenance.

All two-way radio communications systems include integrated assemblages. A failure in any one of these would constitute a failure of communications. However, there are three major factors in a mobile radio communication system which require attention:

a. The primary power source

b. The basic radio units

c. The antenna system

Any successful maintenance program must include the entire system. It would be of no consequence to maintain the basic radio units at top efficiency only to ignore the primary power or the antenna. A failure in either one results directly in a failure of radio communications. Therefore, to be successful in preventive maintenance, a program should be developed and closely followed on a basis of all-inclusive system maintenance. Such a program should include a periodic check on all the factors constituting a radio communications system as follows:

a. Primary Power

Automobile batteries usually fail after a long period of undercharging or overcharging, lack of water, poor connections and old age.

It is important to measure the voltage available at the battery terminals when under a load. A fully charged lead-acid battery will have a measured voltage of approximately 13.0 volts for a 12 volt battery and 6.5 volts for a 6 volt battery. An old sulphated or undercharged battery may show lower voltages. These are battery terminal voltages, not the voltage present at the radio set. The terminal voltage at the radio set will decrease when transmit current is being drawn. The voltage will be lowered approximately 1.1 volts for a 12 volt system and approximately .8 volt for a 6 volt method.

One of the good methods of checking primary power trouble is to measure battery voltage both at the terminals of the battery and at the equipment. An immediate drop in voltage of more than .2 volts measured at the battery on a short transmit cycle would indicate a battery in poor condition. A drop of more than 1 volt measured at the units would point to troubles in the primary circuit--cable, fuse block, relay or chassis return. This voltage drop is excessive and should be investigated fully.

"A" relay contacts wear out, requiring replacement.

Fuses get tired, sometimes even when new they may have too much resistance. Check and replace if voltage drop exceeds .1 volt.

Connections loosen as a result of vibration. Tighten or resolder.

Fuseholders also loosen because of vibration. They lose their temper because of heat resulting from poor contact. Acid causes corrosion. Accumulation of oil and dirt increases contact resistance and the remedial action is to clean contacts, tighten or replace.

Keeping voltage drops to a minimum in a primary circuit is very essential to good system operation. The same rules apply to other sources of power. Dry batteries especially must be checked under full load. Some knowledge of the number of hours of use must be available as an indication of when they most likely will need to be replaced.

b. Unit Assemblages

These include transmitter, receiver, power supply, and associated units. Very few adjustments need to be made regularly in transmitter and receiver units. To catch a maximum number of incipient troubles, the technician must use his eyes, his ears, his sense of touch, and meter measurements, as well as his good judgment and past experience.

Basically four types of observation are required:

Listening Tests

An experienced technician can often detect warnings of impending trouble by noting the audio quality, the noise background and the squelch operation in relation to the settings of the volume and squelch controls. He will come to know the normal signal level he should obtain at given locations with selected stations in a particular system. Degradation of performance will be immediately apparent to the technician who checks the set periodically, whereas the steady operator may become accustomed to a gradually degraded performance.

Visual Inspections

Look for loose bolts, screws and clamps, worn handset cords, burned out pilot lights, arcing at any point, loose or broken components, burned resistors or loose connections. A good visual inspection not only is a means of quickly locating the source of trouble, but may prevent more serious trouble from developing later.

Touch

The fingers are good detectors of improper temperature conditions. Fuses, fuseholders, crystal ovens, transformers and relay coils which are too hot mean trouble. Also, a cold crystal oven, tube or resistor that should normally be warm is probably in trouble. Such tests are quick and should be used often.

Meter Measurements

Actual quantitative measurements of "A" and "B" voltages, grid and plate currents, power output, frequency and deviation have no substitute; their meaning is definite. Experience will indicate to what degree variation can be tolerated. Good test equipment is essential to good system performance.

c. Antennas

Visual check of antenna, antenna mount, cable, and connectors should be made periodically, as well as a meter check to find any open or shorted lines. Remember that the antenna must efficiently radiate the power developed in the transmitter chassis and also transfer to the receiver the minute voltages picked up from the distant transmitter to produce a good audible signal. Failure of the antenna or line is a failure of the communications system.

d. Netting

Netting of receivers and transmitters in any system is more important than usually realized. The term "netting" means that all receivers and transmitters in a given system are aligned on the same frequency or frequencies. With modern selectivity requirements, it is more than ever necessary to tune every receiver exactly to the station it must receive. Careful "netting" of all units in an integrated system to the correct frequency is a first order requirement of a modern communications system and will eliminate a prime cause of poor system performance. It is in this field of system operation that the high frequency stability and selectivity stability is of major importance.

Frequent checks of transmitter deviation will improve system operation. A good rule to follow is to check performance frequently and make

adjustments only when actual tests and measurements show improper operation.

2. MAINTENANCE CHECKS

A good preventive maintenance program requires a complete system check at least every three months and it is recommended that individual records be kept of each unit. In a general way the following items should be part of any preventive maintenance routine.

a. Clean and dust the equipment thoroughly.

b. Make a thorough mechanical imspection of the entire mobile installation.

c. Check the battery terminals. Battery connections must be clean and tight at all times to prevent power losses due to excessive voltage drops across loose connections.

d. Check the fuses. Fuses must fit snugly in the fuse holders to prevent voltage drops at these points.

e. The vehicle battery should be checked at least once a month, however, it is recommended to make this check weekly to assure that it is properly charged. A specific gravity measurement is recommended for this purpose. The reading obtained should be in agreement with the normal operating specifications stipulated by the battery manufacturer.

f. Check the A-plus voltage at the battery and at the radio set with the radio equipment turned "on" and the vehicle motor turned "off".

g. Check the d-c resistance from the inner conductor to the outer conductor of the antenna coaxial lead-in cable.

h. Power Input Cables

Power cable connections may be checked by measuring the overall voltage drop from the battery to the equipment. With the transmitter "on" and the vehicle motor running, the voltage drop from the ground cable of the radio equipment to the battery ground terminal should be negligible. The voltage drop in the power cable from the (hot) battery terminal to the equipment should not exceed 1 volt. Cable voltage drop will be the difference between the voltage reading obtained from the battery terminal to ground and the reading obtained from a voltage input point on the mobile equipment to ground. These voltage measurements should be made with an accurate d-c voltmeter. Proper operation of this equipment depends upon correct input voltage. The input voltage may be measured at the fuse located on the top front end of the power supply chassis (terminal with yellow lead attached). The drawer assembly must be partially pulled out of the mobile housing to permit access to convenient voltage input measuring point.

i. Vehicle Generator and Voltage Regulator

Routine Maintenance Checks should be made on the vehicle generator and voltage regulator to insure proper operation of the radio equipment. Periodic maintenance should include:

(1) Checks of generator brush condition and replacement if necessary.

(2) Checks of generator armature condition.

(3) Check of generator output and voltage regulator setting. This setting should conform to either the car manufacturer's or the generator manufacturer's recommendations.

(4) Check of generator lubrication and relubrication if required.

j. Antenna

Routine preventive maintenance of mobile systems should include a continuity check of the braided lead between the antenna rod and the coaxial lead-in. Ordinarily hidden from view within the base assembly, the lead may become frayed or broken without attracting immediate notice. However, any decrease in r-f continuity introduced here will cause a decrease in radiated power and receiver sensitivity. Moreover, intermittent contact can generate undesirable interference in the form of noise caused by:

(1) high contact resistance

(2) imperfect bonding which permits the inherent noise to enter the receiver

k. Clean the relay contacts.

l. Check all transmitter and receiver stage meter readings and replace any tubes and transistors as required.

Transistors located in the heat sink on the front panel are coated with DC-4 silicone grease. This grease increases the rate of heat transfer.

Note that a thin mica insulator is between each transistor and the front panel. When replacing a transistor, first coat it with silicone grease and place the insulator between the transistor and the front panel. There also must be silicone grease between the mica washer and the heat sink. Replace the mica insulator if it is damaged.

m. Check the filament voltage and the B+ voltages.

n. Set the transmitter oscillators on frequency.

o. Tune the entire transmitter.

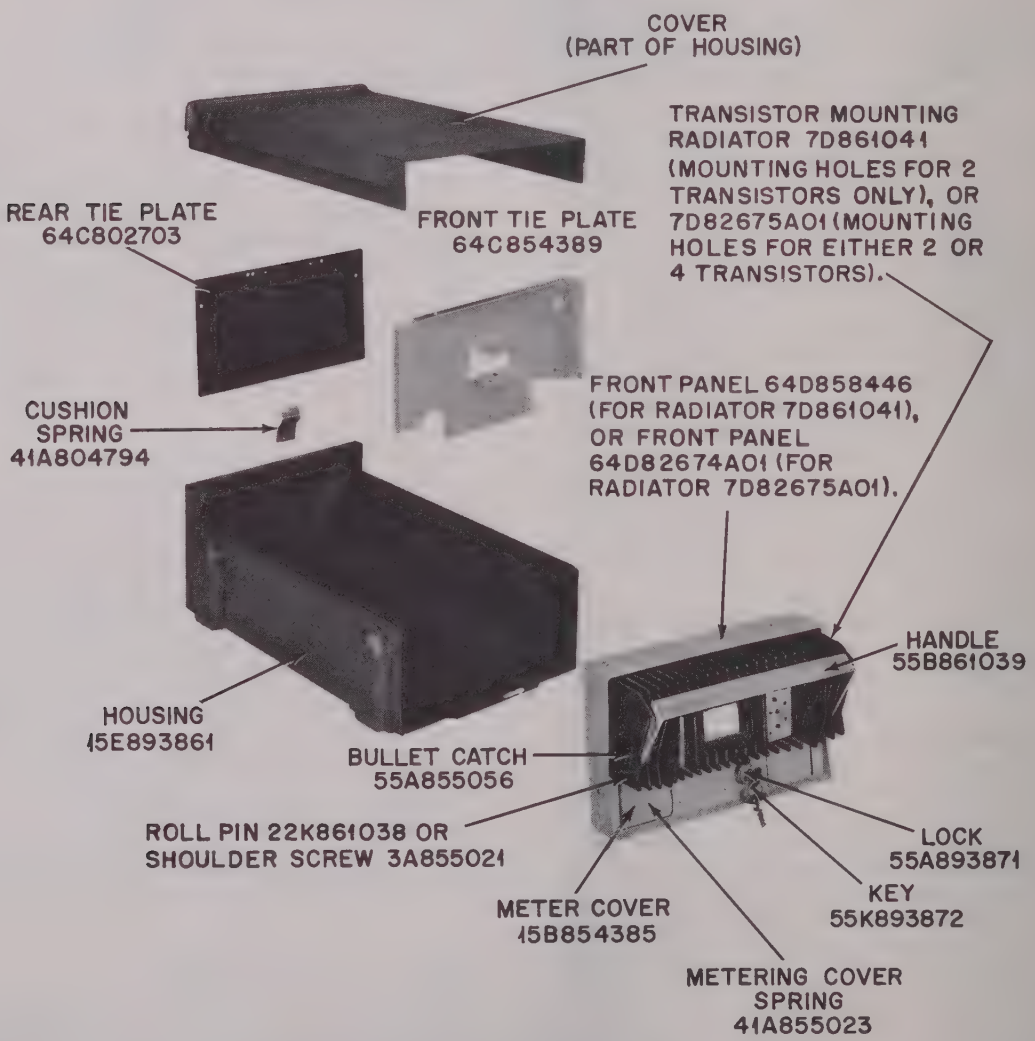
p. Check the transmitter modulation.

q. Tune the entire receiver.

r. Check the audio response against a fixed station.

NOTE

For detailed alignment procedures of the various chassis refer to the pertaining instruction section of this instruction manual.


COVER
(PART OF HOUSING)
TRANSISTOR MOUNTING RADIATOR 7D861041 (MOUNTING HOLES FOR 2 TRANSISTORS ONLY), OR 7D82675A01 (MOUNTING HOLES FOR EITHER 2 OR 4 TRANSISTORS).
REAR TIE PLATE 64C802703
FRONT TIE PLATE 64C854389
FRONT PANEL 64D858446 (FOR RADIATOR 7D861041), OR FRONT PANEL 64D82674A01 (FOR RADIATOR 7D82675A01).
CUSHION SPRING 41A804794
HANDLE 55B861039
HOUSING 15E893861
BULLET CATCH 55A855056
ROLL PIN 22K861038 OR SHOULDER SCREW 3A855021
LOCK 55A893871
KEY 55K893872
METER COVER 15B854385
METERING COVER SPRING 41A855023

HOUSING PARTS IDENTIFICATION DETAIL

AEPD-1285-A (CE830)

INSTRUCTION MANUAL REVISION MR-1548

GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual

INSTRUCTION MANUAL(S) AFFECTED: (25-50 MC) Mobile and Base Station FM Two-Way Radio Sets

REVISION DETAILS

With this change the following becomes effective:

Instruction Manual No.	Schematic Diagram No.	New Issue	Receiver Chassis	New * Suffix	Change Item No.
68P854520-F,	63E81009A77	C	TRB1071AA	10	1
68P854520-G,			TRB1072AA	9	
68P81003A60-D,			TRB1073AA	9	
68P81018A60-A,			TRB1071AB	11	
68P81018A65-A			TRB1072AB	10	
			TRB1073AB	10	
68P81003A60-A,	63E862649	J	TRB1071AC	11	1,2
68P81018A65-A,			TRB1072AC	10	
68P854520-F,			TRB1073AC	10	
68P854520-G			TRB1071AD	12	
			TRB1072AD	11	
			TRB1073AD	11	
68P81003A60-A	63E854590	W	TRB1071AE	16	1,2
68P81010A10-B			TRB1072AE	15	
68P81012A95-A,			TRB1073AE	15	
68P81018A65-A			TRB1071AH	11	
68P856590-H			TRB1072AH	10	
			TRB1073AH	10	
			TRB1071AF	17	
			TRB1072AF	16	
			TRB1073AF	16	
68P862800-B,	63E854952	N	TRB1081AA	11	1
68P862115-F,			TRB1082AA	10	
68P862725-E			TRB1083AA	10	
			TRB1081AB	11	
			TRB1082AB	10	
			TRB1083AB	10	
68P81010A80-A,	63E81010A86	D	TRB1161AD	3	3,4
68P81020A65-O			TRB1162AD	3	

Instruction Manual No.	Schematic Diagram No.	New Issue	Receiver Chassis	New * Suffix	Change Item No.
68P862800-B, 68P862725-E, 68P862115-F	63E854953	S	TRB1081AC TRB1082AC TRB1083AC TRB1081AD TRB1082AD TRB1083AD	12 11 11 12 11 11	1,2
68P862740-C, 68P862805-A, 68P862075-B	63E854992	V	TRB1081AF TRB1083AF TRB1083AF	17 16 16	1
68P862740-C, 68P862805-A, 68P862075-B	63E854993	R	TRB1081AH TRB1082AH TRB1083AH	13 12 12	1,2

*NOTE

When the letter "A" follows the suffix number stamped on your unit, it indicates some of the previous changes are not included.

Component Changes

Change Item No.	Ref. Sym.	Action	Part Number	Description
1	L104	Changed to	24K861207	COIL, RF: choke; 0.82 uh
2	L205,	Changed to		Same as Change Item No. 1
3	L104H	Changed to		Same as Change Item No. 1
4	L204	Changed to		Same as Change Item No. 1

GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

REVISION DETAILS

With this change the following becomes effective:

Instruction Manual No.	Schematic Diagram	New Issue	Change Item No.	Receiver Unit	New Suffix
68P862800-B, 68P862115-F,	63E854952	M	1	TRB1081AA, TRB1081AB	10 10
68P862725-D, 68P862725-E	63E854953	R	1	TRB1081AC, TRB1081AD	11 11
68P854520-F, 68P81003A60-C,	63E81009A77	B	1	TRB1071AA, TRB1071AB	9 10
68P81018A60-A, 68P81018A65-A	63E862649	H	1	TRB1071AC, TRB1071AD	10 11
68P856590-G, 68P81003A60-C, 68P81010A10-B, 68P81012A85-A, 68P81018A65-A	63E854590	V	2	TRB1071AE, TRB1071AF, TRB1071AH	15 16 10
68P862805-A, 68P862075-B, 68P862740-C	63E854992 63E854993	U P	3 3	TRB1081AE, TRB1081AF TRB1081AH	16 16 12

Component Changes

Change Item No.	Ref. Sym.	Action	Part Number	Description
1	C120	Changed to		
	C120L, C120M, C120H, C120HH		21C82450B16	CAPACITOR, fixed: 0.62 uuf ±10%; 500 v
			21C83959	CAPACITOR, fixed: 1 uuf ±0.2 uuf; 500 v

Change Item No.	Ref. Sym.	Action	Part Number	Description
2	C114	Changed to		
	C114L		21C82450B16	CAPACITOR, fixed; 0.62 uuf ±10%; 500 v
	C114M, C114H, C114HH		21C83959	CAPACITOR, fixed: 1 uuf ±0.2 uuf; 500 v
3	C114	Changed to		
	C114L		21C82450B16	CAPACITOR, fixed: 0.62 uuf ±10%; 500 v
	C114M, C114H		21C83959	CAPACITOR, fixed: 1 uuf ±0.2 uuf; 500 v

LATEST REVISION DETAILS

Schematic Diagram	New Issue	Receiver Unit	New Suffix
63E854952	M	TRB1081AA,	10
		TRB1081AB	10
63E854953	R	TRB1081AC,	11
		TRB1081AD	11

Ref. Sym.	Action	Part No.	Description
C120	Changed to		
C120L		21C82450B16	CAPACITOR, fixed: 0.62 uuf ±10%; 500 v
C120M, 120H, 120HH		21C83959	CAPACITOR, fixed: 1 uuf ±0.2 uuf; 500 v

63E854952	N	TRB1081AA	11
		TRB1082AA	10
		TRB1083AA	10
		TRB1081AB	11
		TRB1082AB	10
		TRB1083AB	10

Change Item No.	Ref. Sym.	Action	Part Number	Description
1	L104	Changed to	24K861207	COIL, RF: choke; 0.82 uh

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